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THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

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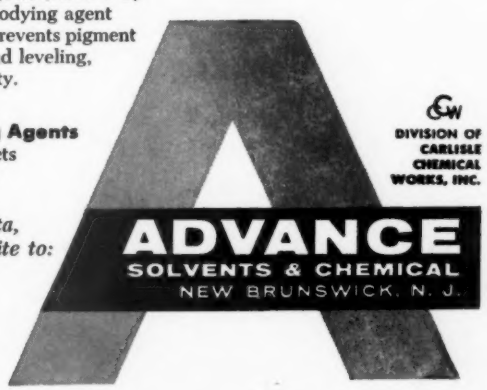

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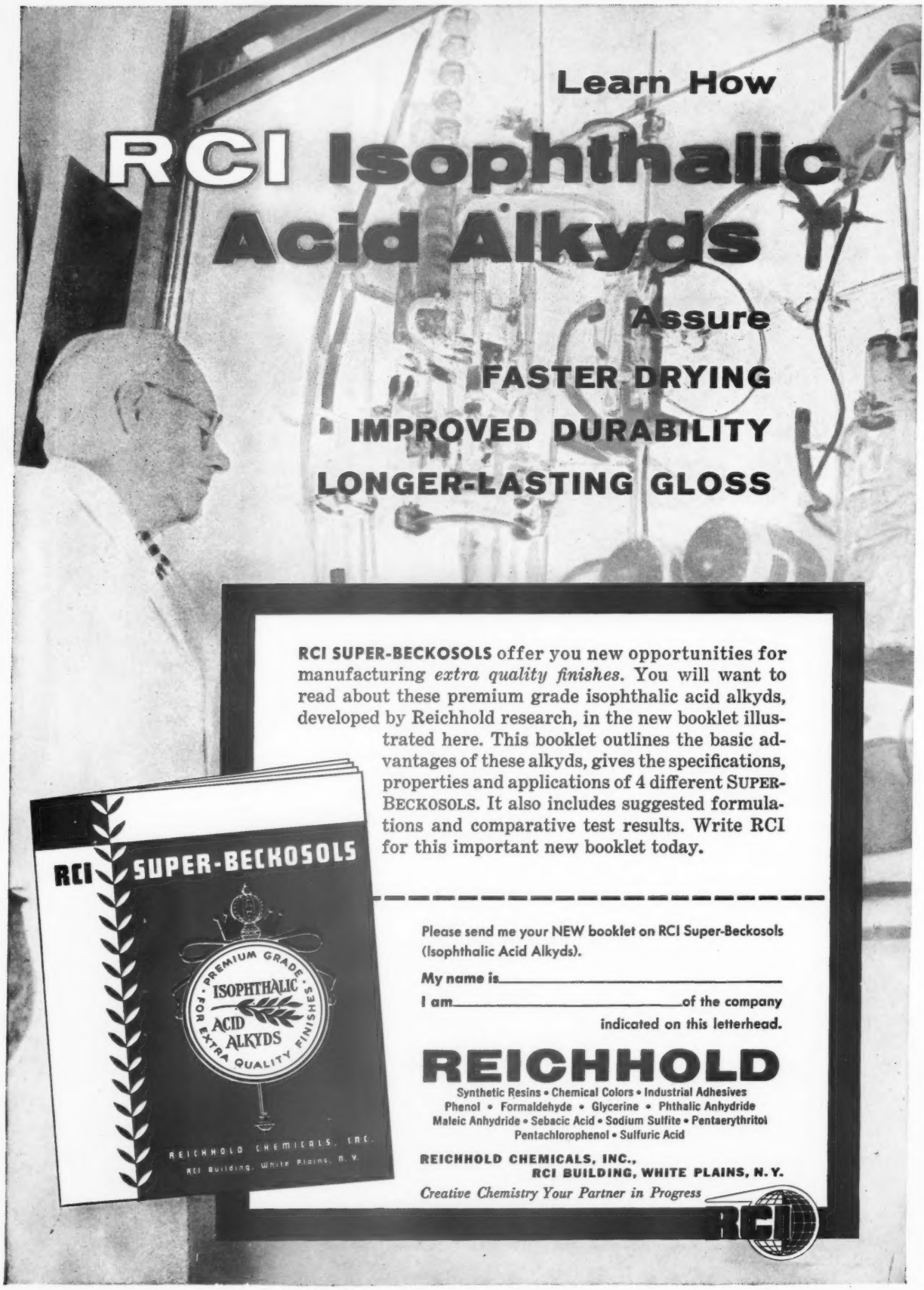

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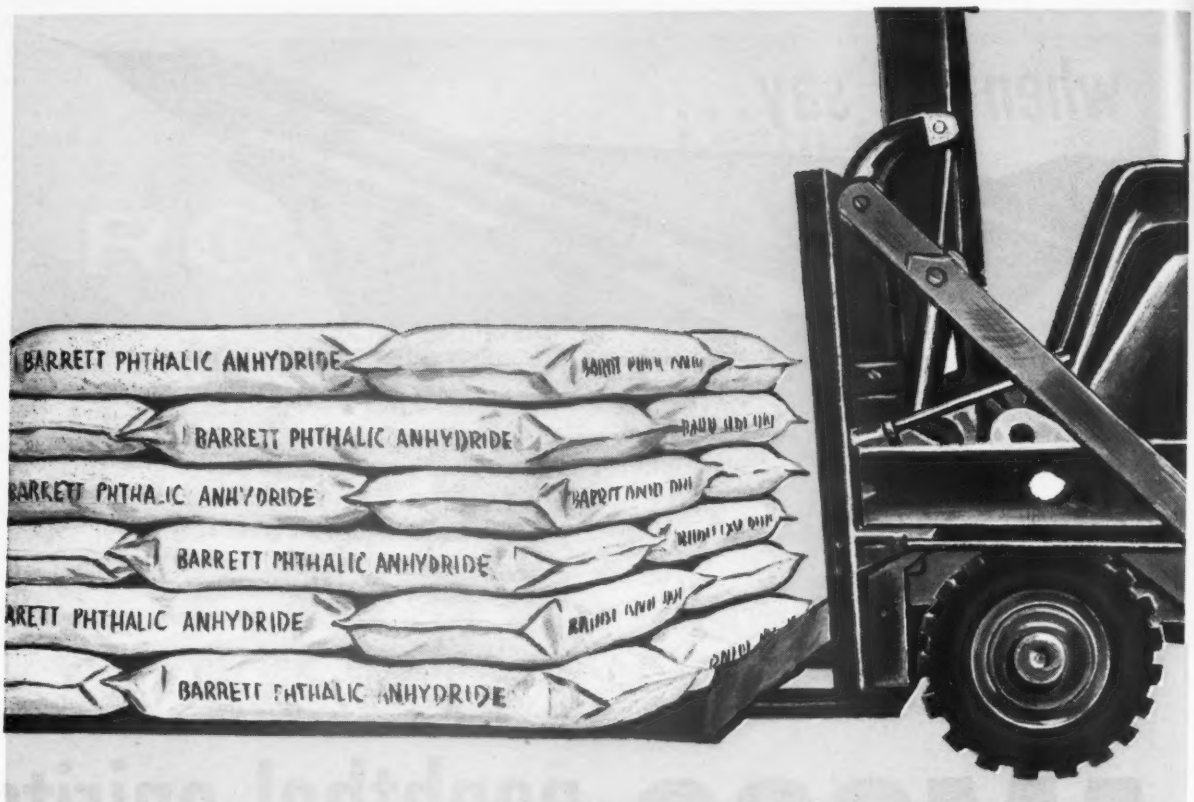

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VOL. 47 AUGUST, 1957 NO. 9

NEXT ISSUE

An informative article concerned with the optical effects of titanium dioxide upon industrial finishes is scheduled for the September number.

The authors review the physical properties of titanium dioxide (anatase and rutile) and point out the effect that both these types have on the characteristics of finishes formulated with this important pigment. Of particular interest is a study showing that the absorption spectra of both anatase and rutile are related to such pigmentary properties as color, hiding efficiency and photochemical stability.

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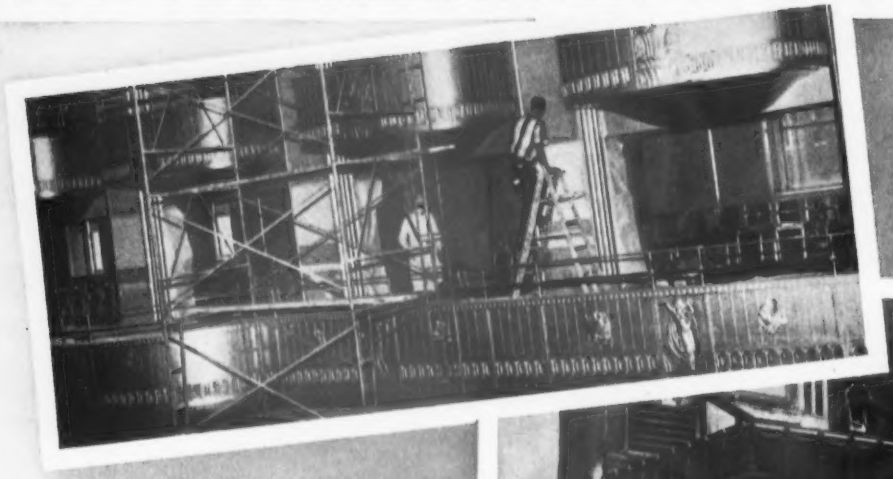

An Epon resin-based bronze coating replaces expensive gold leaf in Waldorf ballroom.

The Waldorf-Astoria,
New York City, saves money with new interior-exterior coating . . . for masonry, limestone, plaster, metal and wood

Light area shows Tower entrance coated with Epon resin-based formulation. Dark area above, uncoated, shows ravages of atmosphere.

Here's how...

Painting costs less at the famous Waldorf now, thanks to a new Epon resin-based coating called Porselon*. It lasts longer and gives much greater surface protection than ordinary coatings.

Epon resin-based Porselon proved its outstanding worth in 1954 when it was tried experimentally on an exterior limestone surface over the hotel's Tower entrance. Despite three years of exposure to New York's destructive atmosphere of fly ash, soot and grime—the test coating has not been affected in any noticeable way.

The success of this severe test has led to consideration of a giant exterior resurfacing program, which would include Porselon-coating the exterior of the Waldorf, 20 stories high.

Interior applications of Porselon include the famous Waldorf Grand Ballroom (walls, gilt decorations, metal railings, wood), lobbies (masonry), and the Coffee House (plaster). In all cases, the Epon resin-based Porselon proved to have excellent adhesion and high resistance to abrasion and corrosives.

Porselon was used, too, on exterior cooling towers, condensers and exposed piping of the hotel's air-conditioning system. Coatings used previously deteriorated so rapidly that the metal surfaces corroded between paintings. With Porselon, the corrosion was successfully controlled.

Paint users everywhere now recognize the advantages of Epon resin-based formulations. Your Shell Chemical salesman will explain how Epon resins can improve your own formulations. Write for the brochures, "Epon Resins for Surface Coatings" and "Epon Resin Esters for Surface Coatings."

*Porselon is manufactured by Protex-a-Cote, Inc. of Newark, New Jersey.

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How Is Your Report Writing?

A FREQUENT complaint of management today is that most technical people do not write well. Too often reports written by scientists and engineers are ambiguous, long winded and lack continuity.

To help solve the problem, some firms have instituted a course in report writing as part of the training program of new technical employees. Others have provided guides for technical writing in an effort to obtain readable and intelligible reports.

Basic reasons given for poor report writing among scientific people are lack of proper training in our science and engineering schools, and an inherent attitude of most technical men that they simply cannot write.

The mechanics of report writing follow a simple and standardized pattern, namely Introduction, Investigation, Discussion of Results, Conclusions and Recommendations. Let us analyze each of the above headings.

Introduction—This part of the report is concerned with the objective of the work, why the work is of interest to the company, and what is the background of the work. Inclusion of the background is desirable since it carries a record of all the available information when the work was undertaken, and it also may point out what new developments might be investigated in connection with this work.

Investigation—Sometimes this is called the experimental section and simply deals with how the work was done and what were the results. Avoid a long discussion of the experimental set-up and test methods involved. A brief summary of the standard procedure is sufficient. Results should be given in a systematic manner. Tables and charts often enhance the presentation of experimental results.

Discussions of Results—This is one of the most important parts of a technical report. The discussion can make or break a report. It is here that your technical knowledge, reasoning ability and, more important, your ability to analyze the experimental data obtained come into focus. The discussion is to show what the results mean. If possible, graphs or charts should be used to accomplish this purpose.

Conclusions and Recommendations—Conclusions are facts brought out in the results and should be specific and accurate. Recommendations should be sound and concrete. They suggest a course of action to be taken as a result of the work, either by outlining future work or by suggesting how the information obtained can be best used.

Many firms require that a summary be included in a technical report. The summary is considered by some the most important part of the report as it will indicate how well the work was carried out. Usually a summary can be handled in three short paragraphs:—The first paragraph discussing briefly the purpose of the report, what was done, and a summary of the results; the second concisely stating the conclusion; and the third containing recommendations.

Good report writing is vital to you and your job for it helps you to plan your work, understand your results and get the full measure of information from your studies. But of more importance it acquaints you with your top superiors indicating to them your ability and foresight upon which basic decisions will be made.

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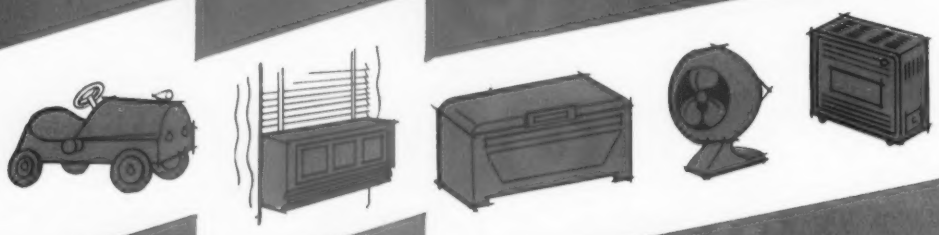

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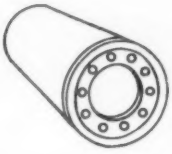
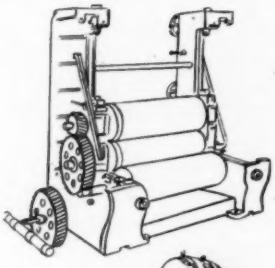


or a large production mill that should be rebuilt



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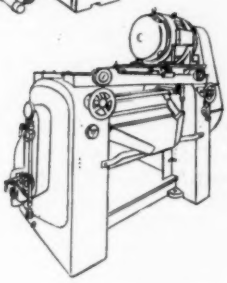

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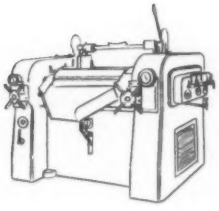

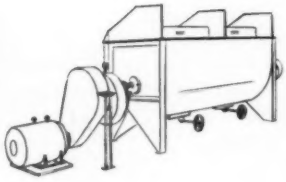

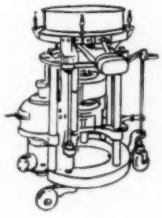

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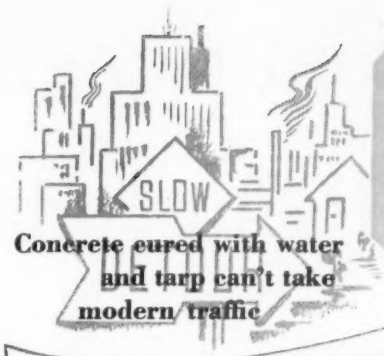
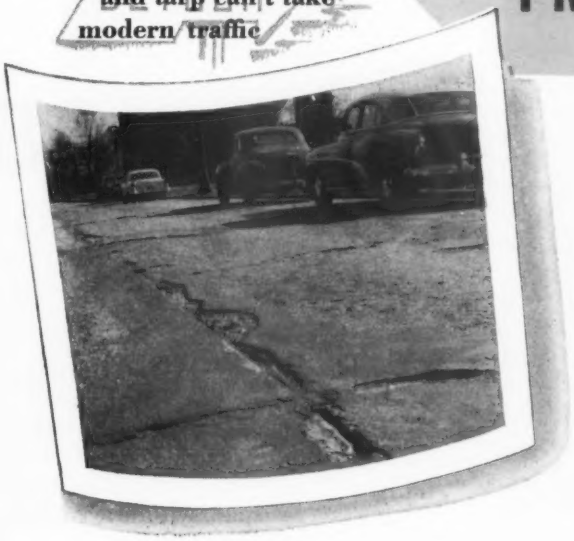
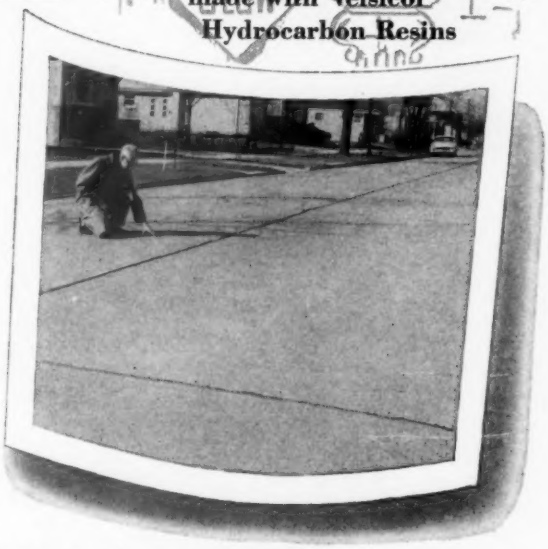
Which picture shows a PROFIT?



Concrete cured with water and tarp can't take modern traffic



New road construction has created a booming market for concrete curing compounds made with Velsicol Hydrocarbon Resins



The nation's accelerated highway program and increased architectural uses of concrete have opened rich new markets for membrane curing compounds made with Velsicol Hydrocarbon Resins. These compounds form moisture-proof "skins" that retard evaporation of water from freshly poured concrete, making it set with greater hardness, reducing dusting and shrinkage, and eliminating surface checking. Let Velsicol show you how to enter or increase your share of this booming market with suggested formulations meeting the U.S. Army Corps of Engineers, specification CRD-C 300-55 and proven superior in actual use. Send for Velsicol's Membrane Curing Compound Bulletin —and your Velsicol representative—today! No cost or obligation, of course.

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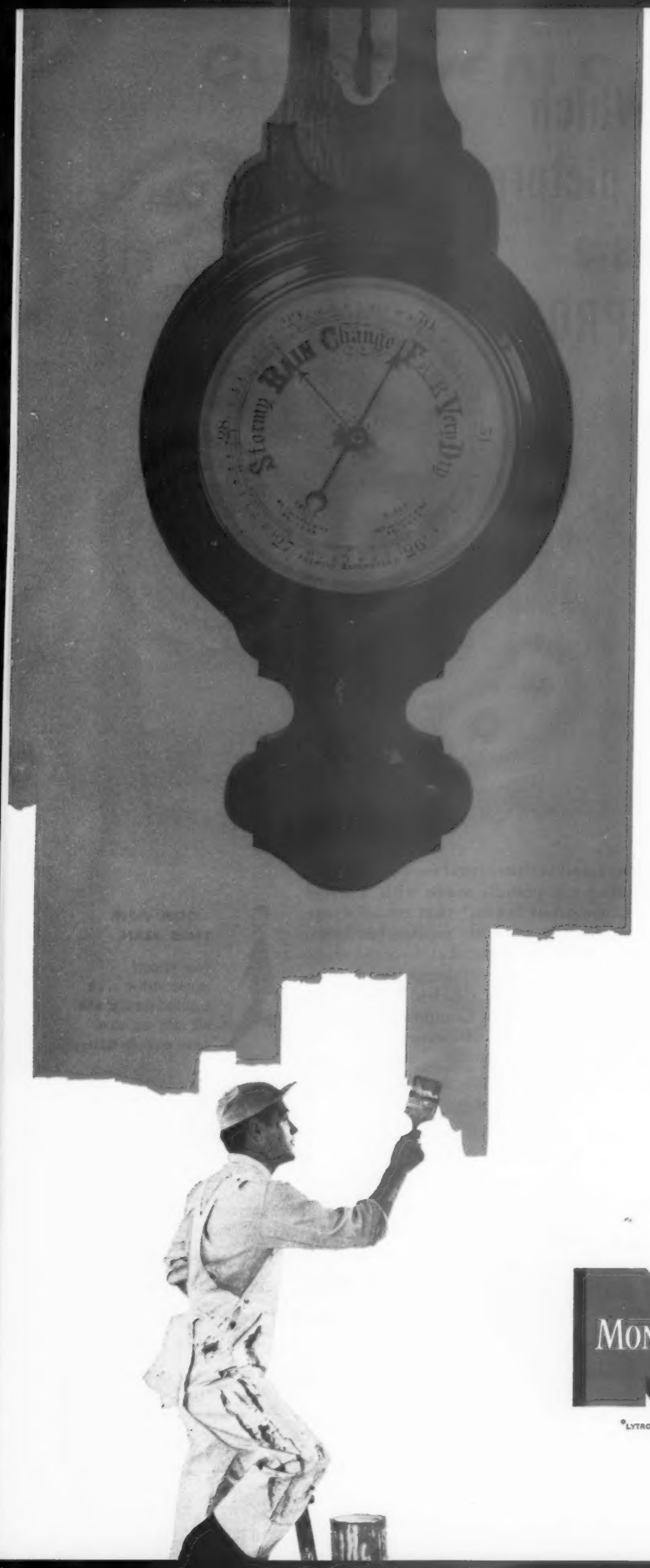

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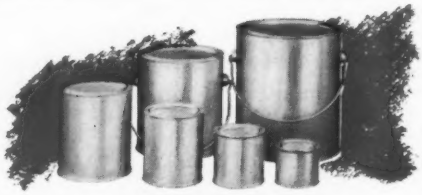

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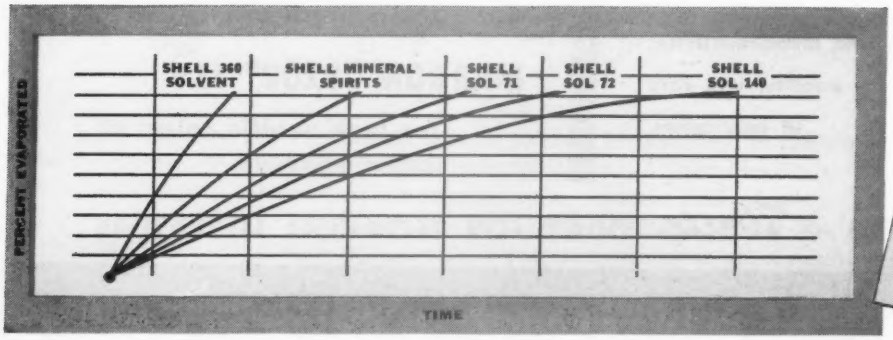

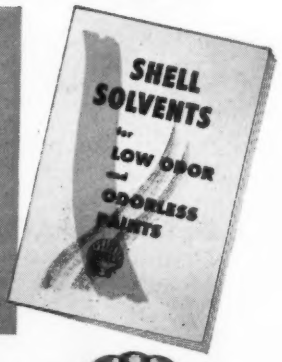

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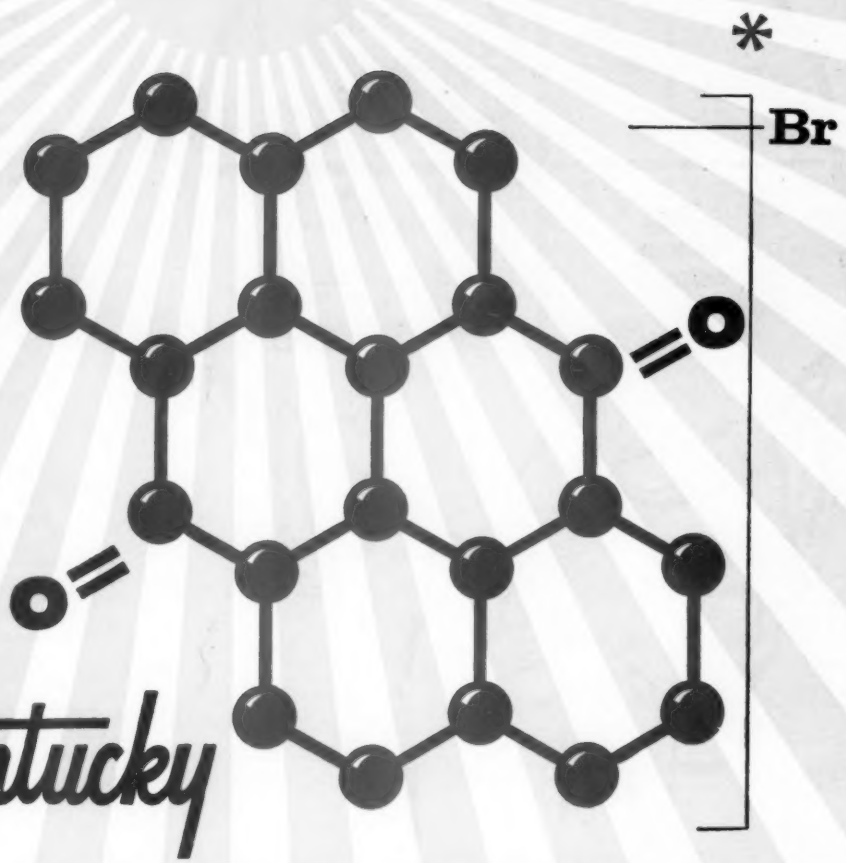

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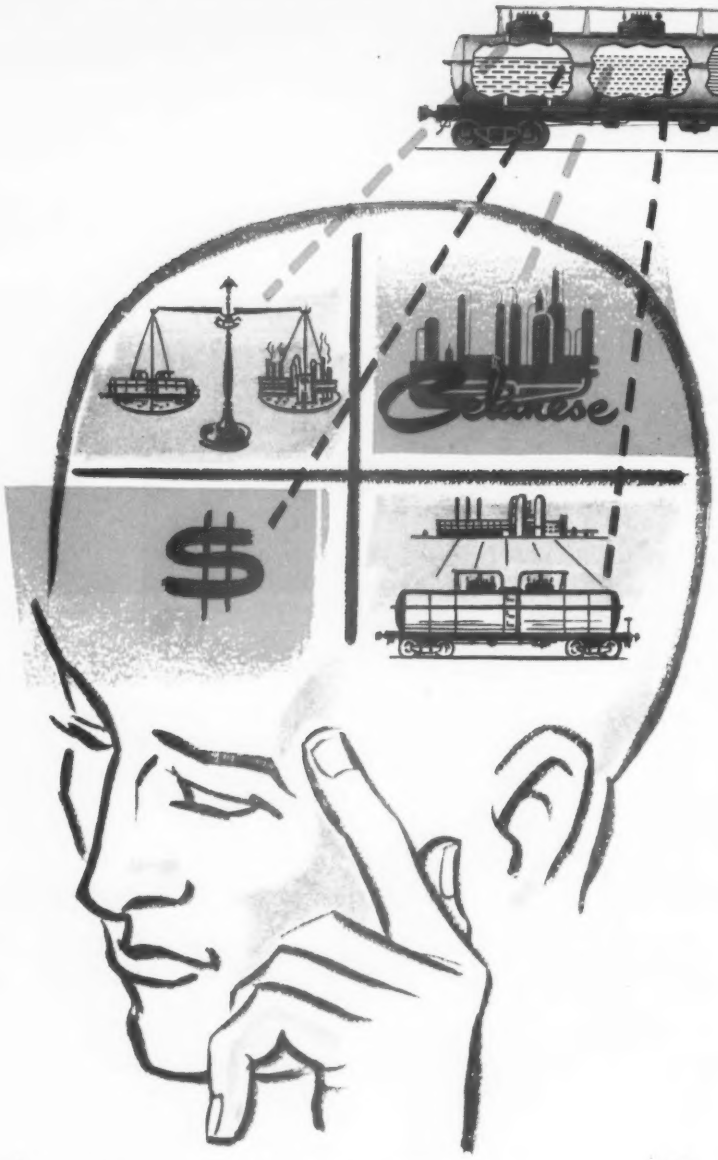

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HIGH-LOW SOLVENT SYSTEMS FOR WOOD LACQUERS

By
R. F. Buller*

THE build-up of a topcoat dry film thickness of say 2.5-3.0 mils using a conventional good-quality cold-spray furniture lacquer of 21 per cent by weight solids usually requires a multi-coat operation which can be costly and time consuming. In order to overcome this disadvantage, lacquer technologists have developed the so-called high-film build lacquer. The ability of these lacquers to provide desired film thickness in a one-, or at most, two-coat spray operation will often provide appreciable economies. Besides eliminating one spraying operation, a satisfactory high-build lacquer offers the furniture manufacturer an opportunity to increase his topcoat finishing rate or conversely conduct his coating operation within a smaller area.

What are some of the methods used in designing high-build lacquers, and how do they compare with one another?

The principle techniques used to accomplish high-build include:

1. Cold spraying of high-solids lacquers—30%w or more solids.
2. Hot spraying of high-solids lacquer—30%w or more solids.
3. Use of high-solvency solvents—high-low systems.

High-Solids Lacquers, Cold-Spray Type

Lacquers containing 30 per cent by weight or more solids designed for cold spraying in conventional solvent systems are generally formulated with low-viscosity nitrocellulose and employ high resin to nitrocellulose ratios. Hence, some sacrifice in film properties must be made, notably cold-check resistance and hardness.

This article was prepared from a presentation to the Industrial Product Finishes Technical Subcommittee of the National Paint, Varnish and Lacquer Association, Boca Raton, Florida, February 28, 1957.

* Shell Chemical Corp., Union, N. J.

High-Solids Lacquers, Hot-Spray Type

Hot spray lacquers may be formulated with conventional solids to provide excellent film properties. Since a reduction to application viscosity depends on the use of heat (usually about 160°F), solids contents of over 30 per cent by weight may be sprayed without difficulty providing the solvent system is properly balanced.

High-Solvency Solvents—High-Low Systems

Of the techniques which may be used to obtain high-build furniture lacquers, the high-low solvent approach seems to offer interesting possibilities. The performance of these systems is based on a theory which Wardley D. McMaster[1] of General Motors Corporation has described. Formulations designed in accordance with this theory permit high-build without sacrifice in film quality and may be applied with conventional cold-spray equipment.

As the name implies, high-low lacquer systems are based on use of low- and high-boiling solvents. Acetone and methyl ethyl ketone are examples of suitable low-boiling active solvents, while ethyl amyl ketone and diacetone alcohol perform quite satisfactorily as high-boiler actives. The diluent portion may contain predominantly low-boiling petroleum types such as "Tolu-Sol" Diluent*, but some aromatic diluent such as xylene can be included. Latent solvents, such as isopropyl alcohol and methyl isobutyl carbinol, also have a place in these formulations.

Part of the solvent system of any lacquer evaporates and is lost between the spray gun and the work. In a high-low lacquer, the sizeable portion of low-boiler, which provides the necessary low viscosity during atomization, and the aliphatic diluent almost entirely evaporate before the lacquer strikes the object being coated, thus resulting in a rapid build-up

* An aliphatic naphtha supplied by Shell Oil Company, distillation range 203-219°F.

of viscosity and solids. This viscosity build-up prevents sagging and running of that portion of the film in a vertical plane while the remaining slow-evaporating solvents promote flow and leveling during the drying period. Under certain conditions, high-low formulations may be sprayed with slow gun speeds, thus providing additional film build. Hence, a high percentage of solids at the gun is not the critical factor in achieving high-film build with this technique; and accordingly, formulations ranging from 20-25 per cent solids can be quite suitable.

Solvent Power of High-Low Formulations

Although the solvency at normal room temperature of a high-low furniture lacquer solvent system is considerably greater than that of a conventional cold-spray solvent blend, it is less than that of a typical hot lacquer system at 160°F.

Table 1 shows a comparison of the per cent solids attainable at a typical spraying viscosity using good-quality solvent systems representative of conventional cold-spray, hot-spray and high-low types. In this example, the solids composition selected for comparison will provide lacquers with high cold-check resistance (25+ cycles) and excellent resistance to household chemicals. Film hardness is of a high order and print resistance is excellent. Solvent systems compared all provide good flow, leveling, and blush resistance.

Formulation of High-Low Lacquers

To obtain satisfactory performance with a high-low lacquer system, the percentage of fast- and slow-evaporating solvents must be carefully selected. Three examples of high-low lacquer formulations and several important performance properties are listed in Table 2. Figure 1 shows the comparative volatility

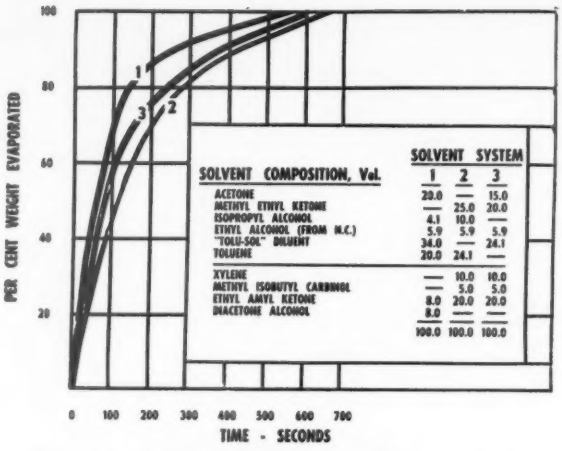

Figure 1. Volatility of high-low solvent systems (77: F, 0-5% R.H.)

of the solvent systems as determined with the Shell Thin Film Evaporometer. The method of operating the Thin Film Evaporometer has been described by McGuigan.[2]

Formulation No. 1, it will be noted, contains 84 per cent of solvents in the relatively fast-evaporating category. This formulation is shown to be unsatisfactory, since it bubbled under the sprayout conditions. Formulations No. 2 and No. 3 which can be sprayed at lacquer yields of 1.5 pints per minute to provide films of over 2.5 mils dry thickness in one coat without bubbling or pinholing, contain only 65 per cent of the fast evaporating class of solvents.

Effect of Spray Gun Speed on Film Build

A high percentage of solids in a high-low lacquer at

	Conventional	High-Low	Hot Lacquer
Solids Concentration, Per Cent Weight	20.0	25.4	31.0
Solids Composition, Parts by Weight			
R.S. ¼-second Nitrocellulose (dry basis)	10	10	10
Non-Oxidizing Alkyd, 30-34% Oil, Coconut (100%)	10	10	10
Dioctyl Phthalate	4	4	4
Solvent Composition, Parts by Volume			
Acetone	—	15.0	—
Methyl Ethyl Ketone	—	20.0	—
Methyl Isobutyl Ketone	32.0	—	32.0
Isopropyl Alcohol	5.9	—	—
Ethyl Alcohol (from Nitrocellulose)	4.1	5.9	12.5
Methyl Isobutyl Carbinol	5.0	5.0	6.0
Ethyl Amyl Ketone	8.0	20.0	11.0
"Tolu-Sol" Diluent	—	24.1	—
Toluene	25.0	—	—
Xylene	20.0	10.0	38.5
	100.0	100.0	100.0
Viscosity, cp. at 25°C	48	53	56**

* Also contains added ethyl alcohol as "Neosol" (Registered Trade Name) Solvent, Shell Chemical Corporation's Proprietary Grade.
** Viscosity, cp. at 160°F

Table 1. Per cent solids at spraying viscosity in typical cold-spray, high-low and hot-lacquer solvent systems.

Solids Concentration	1	2	3
Pounds of Solids per Gallon of Lacquer	1.76	1.95	1.87
Per Cent Weight	23.8	25.7	25.4
Solids Composition, Parts by Weight			
R.S. ¼-second Nitrocellulose (dry basis)	10	10	10
Non-Oxidizing Alkyd, 30-34% Oil Coconut (100%)	10	10	10
Dioctyl Phthalate	4	4	4
Solvent Composition, Parts by Volume			
Acetone	20.0	—	15.0
Methyl Ethyl Ketone	—	25.0	20.0
Isopropyl Alcohol	4.1	10.0	—
Ethyl Alcohol (from Nitrocellulose)	5.9 (84)	5.9 (65)	5.9 (65)
"Tolu-Sol" Diluent	34.0	—	24.1
Toluene	20.0	24.1	—
Xylene	—	10.0	10.0
Methyl Isobutyl Carbinol	—	5.0	5.0
Ethyl Amyl Ketone	8.0 (16)	20.0 (35)	20.0 (35)
Diacetone Alcohol	8.0	—	—
	100.0	100.0	100.0
***Application Properties**			
Viscosity, at 25°C—Centipoises	70–80	60–70	50–60
Seconds, No. 4 Ford Cup	—	28.0	26.5
Blush Resistance, % R.H. at 80°F	—	80–82	80–82
Gun Speed, Feet per Second	2.0	2.0	2.0
Gun Distance, Inches	12	12	12
Atomization Pressure, psig.	65	65	65
Pot Pressure, psig.	25.5	24.5	23.5
Yield, Pints per Minute	1.5	1.5	1.5
Bubbling and Pinholing (Static Air Dry—75°F)	Present	None	None
Dry Film Thickness, mils			
3 single passes per coat	—	2.5	2.4
4 single passes per coat	—	3.6	3.5

* Automatic Sprayout, AGA Gun, FX Needle, Fluid Tip, 765 Air Cap, Fan Width 10-12 inches.

Table 2. Selected performance characteristics of high low lacquers.

	Formulation 2 Table 3	Formulation 3 Table 2
***Application Conditions**	—Reduced to 23%w Solids—	
Viscosity, cp. at 25°C	35–40	30–35
Atomization Pressure, psig.	65	65
Pot Pressure, psig.	9	8
Yield, Pints per Minute	0.8	0.8
Distance (inches)	9	9
Speed, 0.8 Feet per Second		
Dry Film Thickness, mils		
2 single passes per coat	1.6	1.5
3 single passes per coat	2.7	2.6
4 single passes per coat	3.8–3.9 Sags	3.5
Speed, 1.2 Feet per Second		
Dry Film Thickness, mils		
2 single passes per coat	1.2	1.3
3 single passes per coat	2.0	2.1
4 single passes per coat	2.9	2.7

* Automatic Sprayout, AGA Gun, FX Needle, Fluid Tip, 765 Air Cap, Fan Width 10-12 inches.

Table 3. Effect of gun speed on film build.

	Formulation 2 (Table 3)	Formulation 3 (Table 3)
Set-To-Touch (Minutes), 3 mil dry film	20 approximate	20 approximate
Sward Hardness, Air Dry, 3-mil dry film		
24 hours	32	32
1 week	34	32
KHN_5, Static Air Dry, 75°F	(2.8 mil dry film)	(3.0 mil dry film)
1 hour	0.1	Soft
2 hours	1.1	0.9
4 hours	3.3	3.0
7 hours	4.8	—
9 hours	—	5.0
24 hours	6.4	6.5
48 hours	7.2	—
3 days	—	7.0
7 days	—	8.4
8 days	7.7	—
14 days	8.6	8.2
1 month	10.3	9.1
***KHN_5, Forced Air Dry**		
120°F	(2.2 mil dry film)	(2.6 mil dry film)
1 hour	4.6	5.7
2 hours	6.2	5.7
24 hours	7.4	7.4
100°F	(2.3 mil dry film)	(2.4 mil dry film)
1 hour	1.3	1.4
2 hours	2.9	3.0
24 hours	7.5	7.3

* The KHN_5 forced air dry values were determined at the periods specified after sprayout. Immediately after sprayout, the test lacquers were flashed off for ten minutes and then given a 30-minute bake at the indicated temperature in a circulating air oven.

Table 4. Drying characteristics of high-low lacquers.

spraying viscosity is not necessary to give high film build. Since sag points of properly formulated high-low lacquers may be three mils or greater, a sprayman using these formulations can "pile on" solids by making more than the normal number of passes with the gun. Moreover, he can also spray at a slower rate and thus obtain additional film build.

Table 3 shows effect of spray gun speed on film build when using a 23 per cent by weight solids high-low lacquer. At a constant yield of 0.8 pints per minute and a gun speed of 1.2 feet per second, four passes for a single coat are necessary to obtain dry film thicknesses of over 2.5 mils, whereas only three passes are required if gun speed is reduced to 0.8 feet per second.

Drying Rates of High-Low Lacquers

The use of relatively large percentages of high-boiling solvents in a high-low lacquer quite naturally leads one to wonder if the drying characteristics will be adversely affected. Several techniques are available for measuring the influence of the solvent system on the drying rate of a nitrocellulose lacquer. In the work reported here, the Set-To-Touch time, Sward Rocker and **"Tukon" Microhardness Tester (Model MO) have been employed. The latter instrument, illustrated in Figure 2, is quite adaptable to solvent retention studies. It is a shallow indenter type of apparatus, utilizing a pyramidal-shaped diamond,

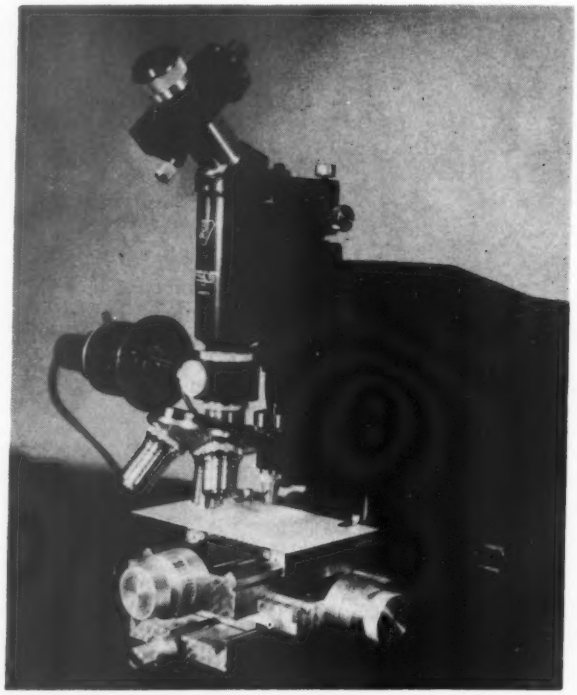

Figure 2. "Tukon" Microhardness Tester.

** Supplied by Wilson Mechanical Instrument Division, American Chain and Cable Company, Incorporated, 230 Park Avenue, New York 17, New York.

known as a Knoop indenter, to which a sufficiently light load (1 to 25 grams) may be applied for the determination of not only ultimate film hardness, but also the change in hardness during the drying period. The test cycle is mechanically controlled and results in a minute diamond-shaped impression in the coating under test, the length of which depends on the load applied and the hardness of the film. The length of the identation is measured with a filar micrometer eyepiece attached to a variable power microscope. From the length of the diamond indentation expressed in filar units, a Knoop Hardness Number (KHN_w) is calculated where "w" represents the weight in grams of the applied load. High KHN_w values indicate hard test specimens.

Figure 3 shows the results of "Tukon" hardness measurements made at periodic intervals during the air-drying of several furniture lacquers based on similar solids composition, but varying solvent systems. Composition of these lacquers is indicated in Table 1. Data provided show KHN_5 values as a function of drying time in hours. It will be observed that the commercial cold-spray type lacquer of unknown composition provides somewhat softer films than the three test lacquers based on the non-oxidizing alkyd resin. Solvent release is shown to proceed at a fast rate from the alkyd resin formulations during the first ten hours of air dry, as evidenced by the rapid increase in KHN_5 values. After this period, solvent is lost more slowly and at about the same rate as the commercial lacquer solids system. In the first 10-15 hours of drying, the high-low lacquer formulation retains slightly more solvent than either the hot lacquer or conventional alkyd lacquer; but after that time, film hardness of the three test lacquers appears to be equivalent.

Rub and Polish Schedule	Degree of Shrinkage One Week After Sprayout
After 24-hour air dry at 77°F	Very Slight
Two hours after 30-minute flash and 60-minute bake at 120°F	Moderate
Two hours after 30-minute flash and 30-minute bake at 90-130°F 30-minute bake at 130°F	Slight

Table 5. Effect of drying schedule on shrinkage. (Dry film thickness approximately three mils)

Table 4 shows KHN_5 values for two of the high-low lacquers listed in Table 2 (Formulations 2 and 3) as a function of air-dry time. Solvent release from these formulations is practically equivalent. For comparative purposes, Set-To-Touch and Sward Hardness values at selected drying-time intervals are provided. Information on the rate of release of solvent from high-low lacquers under forced-dry conditions is also presented in Table 5. For example, these data show that two hours after sprayout, film hardness attained using the 120°F forced-dry schedule more than equals that achieved in over nine hours drying under static air conditions at 75°F.

Shrinkage of High-Low Lacquers

Closely allied with the drying rate of a lacquer is the tendency for the film to shrink after deposition.

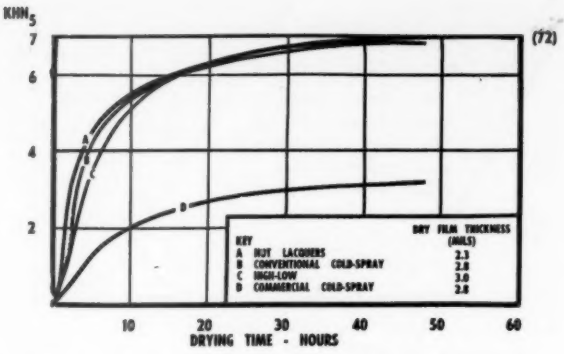

Figure 3. Effect of lacquer drying time on "Tukon" hardness. (Air dry—25°C, 50% R.H.)

Film shrinkage will usually take place in coatings which continue to release solvent for a considerable period of time after they have been laid down. Hence, if such films are rubbed and polished before the major portion of solvent has been released, they will develop an uneven appearing surface as they continue to dry. In extreme cases shrinkage may be so bad that the polished film will gradually return to the appearance it had in its former unpolished state. Therefore, to minimize shrinkage, finishing schedules should be carefully selected to insure maximum release of solvent before the film is rubbed and polished.

Shrinkage problems are not uncommon with conventional lacquers, but may be more of a source of trouble in hot lacquers and high-low lacquers since these latter two formulation types employ larger proportions of slow-evaporating solvents. Data shown in Table 5 indicate the relative degree of shrinkage of High-Low Formulation No. 3, Table 2 when using three different finishing schedules.

Evaluation of shrinkage is somewhat subjective; but these data indicate that for the formulation tested, rubbing after overnight drying at 77°F results in very little shrinkage. Increased shrinkage is noted with the particular accelerated rubbing and polishing schedules selected for study.

Forced Drying of High-Low Lacquers

It has been shown that under static air-dry conditions, single-coat applications yielding 2.5-3.5 mils of dry film thickness which do not show bubbling or pinholing can be obtained from high-low lacquer systems. However, if these films are forced air dried, they may bubble under certain circumstances. Table 6 summarizes the results obtained from a brief study of various factors which appear to affect lacquer bubbling.

The data in Table 6 show quite clearly that the flash time, temperature of forced drying and movement of hot air across the drying panel affect lacquer bubbling. When the forced drying is conducted in a static oven at 120°F, coatings which give a dry film thickness of at least three mils from a one-coat spray operation can be successfully dried without bubbling occurring. However, when using a circulating air oven at 120°F, it is necessary to extend the flash time to 30 minutes if bubble-free films of similar thickness are to be obtained. The rate of circulating air, which

*Application Conditions	High-Low Formulations 2 (Table 3)	3 (Table 3)
Gun Speed, Approximate Feet per Second	1.9	1.9
Gun Distance, Inches	12	12
Atomization Pressure, psig.	65	65
Pot Pressure, psig.	23	23
Yield, Pints per Minute	—	1.5
Number of Passes per Coat	3	3
Number of Coats	1	1
Average Dry Film Thickness (mils)	1.9	2.7
Bubbling Tendency Under Forced-Dry Conditions		
**(Dry Film Thickness in mils at which films are bubble free)		
At 120°F		
Static Oven — 10-minute flash	1.9	2.7–3.0
Forced Air Circulating Oven — 10-minute flash	1.9	<2.7
Forced Air Circulating Oven — 30-minute flash	2.5–3.0	2.5–3.0
At 100°F		
Static Oven — 10-minute flash	2.0	2.7–2.9
Forced Air Circulating Oven — 10-minute flash	***2.3	***2.1

* Hand Sprayout, MBC Gun, FX Needle, Fluid Tip, 765 Air Cap, Fan Width 10-12 inches.
** Film Thickness values given are not necessarily maximum for the static oven drying conditions. For the Specific Forced Air Circulating Oven and flash-off schedule used in these experiments, film thickness values for which no bubbling occurs are probably within a few tenths of a mil of maximum.
*** These dry film thickness values were obtained from sprayouts of the 25 per cent by weight lacquers reduced to 23 per cent by weight solids.

Table 6. Relation of lacquer bubbling and forced drying conditions.

was fixed and not varied in these experiments, will also affect bubbling. For example, with a reduced rate of circulating air, it should be quite possible to force dry films thicker than 1.9 mils at 120°F, using less than a 30-minute flash time.

Summary

Preliminary studies made at Shell Chemical's Union Technical Service Laboratory indicate that the high-low principle may offer an attractive route to the formulation of high-build wood lacquers. This principle and its application to the blending of lacquer thinners, particularly for automotive applications, have been the subject of several trade publications during the past several years by Wardley D. McMaster of General Motors Corporation.

Solvent blends containing a total of around 65 per cent by volume of fast-evaporating solvents and 35 per cent by volume slow-evaporating solvents appear to be good starting formulations for application to wood lacquer systems. For the fast-evaporating portion, a suitable blend can be made using appropriate quantities of acetone, methyl ethyl ketone, isopropyl alcohol and aliphatic naphtha, while a combination of xylene, ethyl amyl ketone and methyl isobutyl carbinol in proper amounts is suggested for the slow-evaporating requirement. Such a high-low system will carry around 25 per cent by weight of premium-quality furniture lacquer solids at spraying viscosity and permit application of 2.5-3.0 mils dry film thickness in one coat. This high-build is attained in three or four passes without occurrance of sagging, where lacquer yields and gun speeds may vary from 1.5 pints per minute and 2.0 feet per second respectively down to 0.8 pints per minute and 0.8 feet per second respectively. Spraying at atomization pressures of 65 pounds gage appears satisfactory. A gun distance of around 12 inches gives good results. Blush resistance, flow and leveling of these formulations is very satisfactory. Bubbling and pinholing is not a problem with films which yield 2.5-3.0 mils dry thickness if they are allowed to dry under static air conditions at temperatures ranging from 75°F to 120°F. If circulating air passes over the drying lacquer, bubbling may occur if the air-flow rate, temperature of drying, and flash-off time are not carefully controlled. These factors are not as critical for coatings of two mils or under dry film thickness. Shrinkage of coatings 2.5-3.0 mils in dry film thickness cast from high-low formulations which are allowed to air dry at temperatures around 77°F for 24 hours before they are rubbed and polished does not appear excessive. However, for similar films where rubbing and polishing must take place the same day the coating is applied, additional studies may be necessary to determine best formulation types and forced drying schedules if less film shrinkage is desired.

Further work on the formulation and performance of high-low wood lacquer systems is planned. This will include more detailed studies of the effects of such variables as high-low solvent balance, rate of air flow, temperature of drying, and flash-off time on forced drying operations. In addition, the "Tukon" Hardness Tester will be employed in an effort to predict ultimate film shrinkability using various formulation and finishing schedules.

References

1. Wardley D. McMaster, A Study of Lacquer Thinner, "Official Digest" of the Federation of Paint and Varnish Production Clubs, April, 1952; A Fancy Formula for Finer Finishes, "Paint and Varnish Production", February, 1956.
2. John P. McGuigan, Thin Film Evaporometer, "Paint and Varnish Production", November, 1956.

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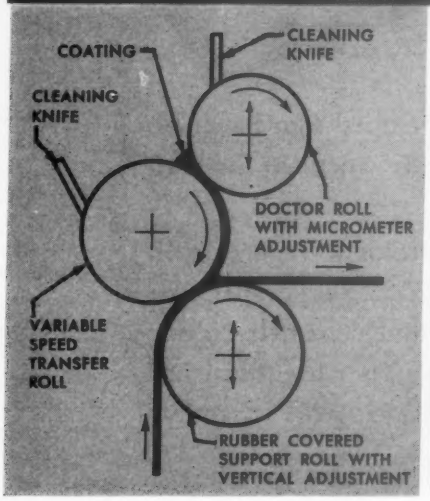

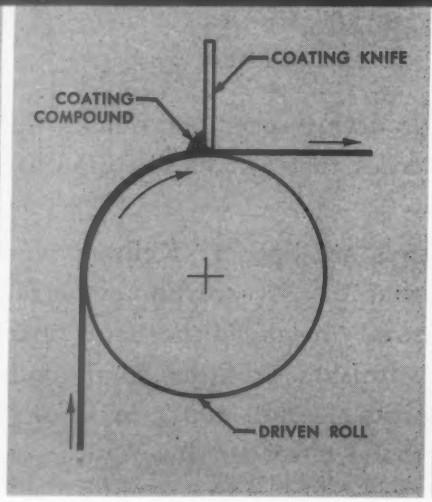

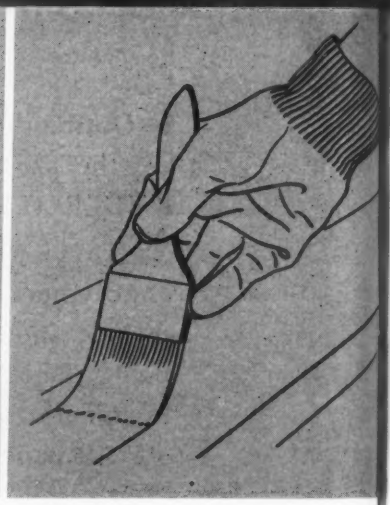

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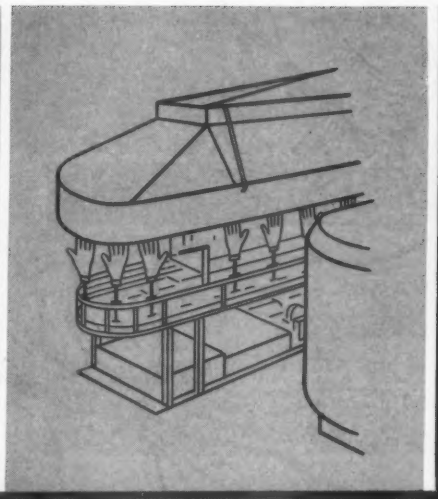

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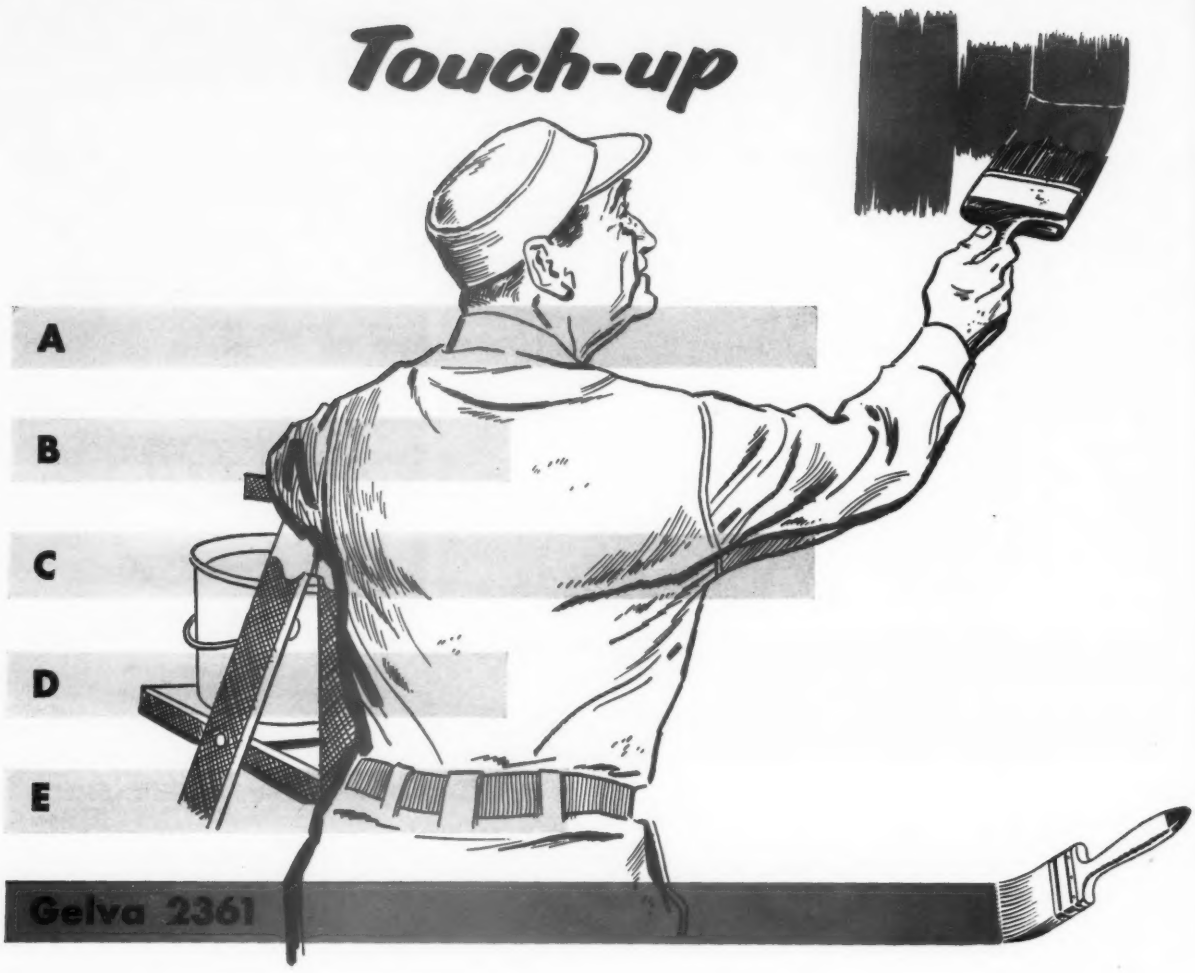

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PROTECTING

SHEET—STEEL PRODUCTS

New approach of applying protective coating on sheet steel prior to fabrication reduces deterioration.

By
A. N. Laubscher
and
C. P. Larrabee

MANY factors must be carefully considered in selecting a combination of organic coating and steel that will yield the satisfactory service life required for the protection of structures in a specific environment. In corrosion protection, the importance of the surface preparation used is universally acknowledged; however, the type of steel used is also important. Moreover, both factors are mutually dependent on the conditions of exposure.

At U. S. Steel's Applied Research Laboratory, these factors have been considered in experimental work extending over many years. Specifically, this article will present a discussion of some work concerned with an evaluation of painted steels exposed in a marine atmosphere. In addition to discussing the influence of surface preparation and type of steel on service life, the writers will describe a "new" approach to the problem of surface preparation, particularly insofar as sheet-steel products are concerned.

This new approach is certainly not unique from the standpoint of logic or of present knowledge—it is new only as compared with current methods for preventing surface deterioration of sheet steels prior to their use. Our procedure is to apply a protective coating at the time the sheets are produced; this eliminates the deterioration that may occur before on-the-job finishing of the product. The various ramifications of this approach are decidedly not simple, and in the final section of this article, a description will be given of some of the considerations involved and also of some new developments that have resulted.

LaQue and Boylan[1] have shown that when paint films are damaged, corrosion spreads faster from the damaged area when the paint has been applied to carbon steel than it does when the same paint has been applied to high-strength low-alloy steel, or even to copper steel. We shall show that in a marine atmosphere, the service life of a paint film is associated with the corrosion resistance of the steel and with the type of surface preparation given the steel before painting.

Experimental Work

Hot-rolled 0.125-inch-thick specimens of carbon steel, copper steel, and a high-strength low-alloy steel[2] were exposed outdoors for one month, and were then wire-brushed and painted. Cold-reduced 0.036-inch-thick sheets of the above steels were painted with the same paint systems as those used on the hot-rolled specimens. One-mil-thick coats of a red-lead linseed-oil primer[3] and of a zinc chromate-alkyd primer[4] were top-coated with 1-mil-thick coats of an iron oxide linseed-oil paint[5]. Specimens thus coated were exposed about 800 feet from the ocean near Kure Beach, North Carolina. The specimens were placed at an angle of 30 degrees to the horizontal, facing south.

Table I shows the number of years elapsing until at least 2 per cent of the paint film had ruptured. For the hot-rolled specimens, it is evident that the red-lead primer did not protect the high-strength low-alloy steel so well as the zinc chromate primer, but that the red-lead primer gave over half again longer service life on the high-strength low-alloy steel than it did on the carbon steel.

Photographs of the hot-rolled panels coated with the red-lead paint system and exposed for 8 years are presented in Figure 1. As shown by the change in color, some corrosion had evidently occurred under the red-lead paint on the high-strength low-alloy steel, but the rust formed was not thick enough to rupture the paint film Figure 2 shows a photograph of duplicate panels coated with the zinc chromate system.

Figure 3 shows that the service life of each red-lead paint film is associated with the corrosion resistance of the steel. Note that the corrosion of the carbon steel increases markedly after 3.5 years.

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The increase is caused by the corrosion that occurs on the groundward side of the carbon steel, where the accumulated sea salt is not removed by rain. This emphasizes the importance of design in preventing corrosion, a fact discussed by Mears and Brown[6] in 1947. Structures that are to be built near the ocean should be designed so that sea salts cannot accumulate on them by evaporation. The atmospheric corrosion rate of most high-strength low-alloy steels will accelerate at some unknown concentration of sea salt; however, under equal exposure conditions, these steels will resist severe corrosion of this type for a longer time than will carbon steel.

The investigation just described is another instance in which emphasis on surface cleanliness has meant the difference between mediocre and good service performance. We recognize that the costs incurred by fabricators and decorators in cleaning and treating steel surfaces represent a significant portion of the cost of the final product. We believe that a sheet-steel product which will not require these operations will have substantial application.

Coating Sheet Steel

Initially, it seemed appropriate to investigate the possibility of producing sheet steel coated with a thin, organic primer coating.

Steel	Surface Condition	Primer Pigment	
		Red Lead	Zinc Chromate
High Strength Low Alloy	Hot-rolled	6.5	*
C1020 Cu (struct. copper)	" "	5.0	5.0
C1020 (struct. carbon)	" "	4.0	4.0
High Strength Low Alloy	Cold-reduced	*	*
C1005 Cu (copper)	" "	*	*
C1005 (carbon)	" "	*	*

* Paint film unbroken after 8 years.

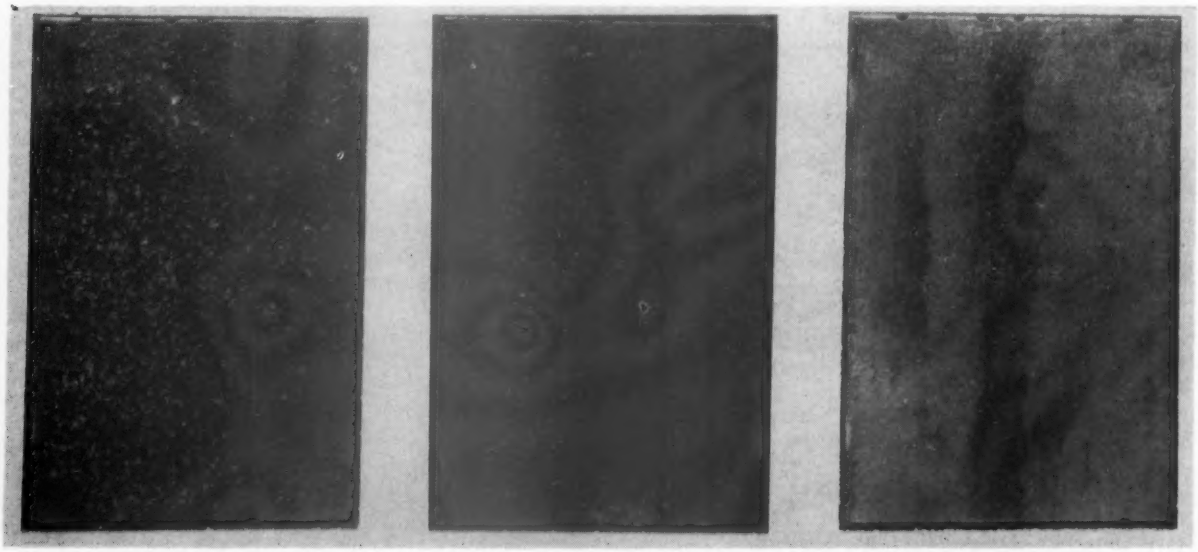
Table 1. Years to failure of paint films on steel in marine atmosphere.

The organic coating should give protection against steel-surface deterioration and underfilm corrosion for the period normally existing between the time the steel is produced and the time it is utilized by a manufacturer. The organic coating must form a satisfactory base, or priming surface, for subsequent application of the finish coats in common use. Moreover, it must be able to withstand severe drawing or fabricating operations.

Another requirement, of course, is that the cost of applying the coating must not be more than the cost of the cleaning and treating operations the coating will be expected to eliminate. It seems obvious that, other factors being equal, the unit cost of applying an organic coating to a continuous strip of steel moving at high speed will be less than it will be when the same coating is applied to sheets or fabricated parts by conventional practices.

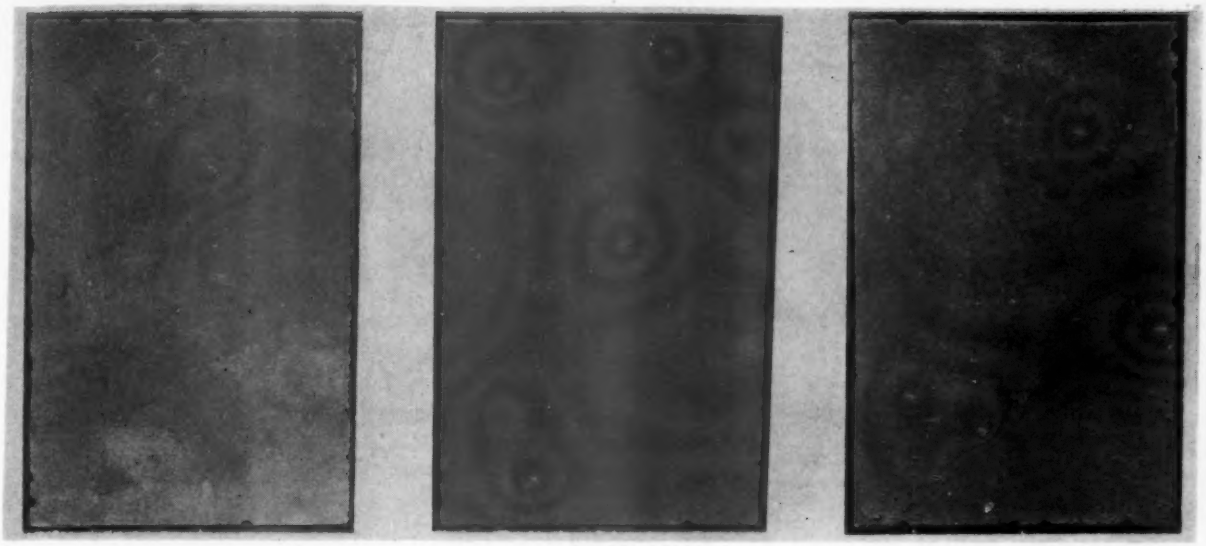
Of the many problems that confronted us in considering this development, a basic one was that of curing organic coatings in a sufficiently short time. Obviously, if the operations were to proceed at high strip speeds, a long curing time would require a strip path of such length that the equipment would be beyond practical engineering limitations in size.

This particular problem was alleviated to a large extent when we found that many coatings in current use could be cured in a very



C1020 Structural Carbon Steel | **C1020 Cu Structural Copper Steel** | **High-Strength Low-Alloy Steel**

Figure 1. Photographs of hot-rolled steel panels that had been coated with a red-lead paint system and exposed 8 years in a marine atmosphere.



C1020
Structural Carbon Steel

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Structural Copper Steel

High-Strength
Low-Alloy Steel

Figure 2. Photographs of hot-rolled steel panels that had been coated with a zinc-chromate paint system and exposed 8 years in a marine atmosphere.

short time if the curing temperature were sufficiently high. In bench-scale laboratory work, for example, thin coatings can be cured in a few seconds without sacrificing properties such as adherence, continuity, and flexibility.

With this basic requirement established, we initiated an exposure test of primer-coated steel panels having a finish coat of conventional decorative coatings of the type used for automobile bodies (automotive finish). In 1954, the panels were exposed in an industrial and in a marine atmosphere. These exposure tests are still in progress; however, the satisfactory results observed after 30 months exposure are illustrated in Figure 4. On the left side of Figure 4 is a photograph of a 4- by 6-inch panel after 30 months exposure in a marine atmosphere. The paint system is an automotive finish consisting of a hand-sprayed primer and a finish coat. The spreading of corrosion from the scratched areas is pronounced. On the right side of Figure 4 is a photograph of a panel with the same type of paint system applied over a thin primer coating. The effectiveness of the thin coating in preventing the spread of rust at the scratched areas is apparent.

These initial experiences with the application of thin primer coatings have led us to consider certain other types of coatings, specifically, the vinyl-steel laminates. The decorative and protective qualities of heavy vinyl films, together with the strength and formability of sheet steel, combine to yield a vinyl-steel laminate product that should have increasingly extended applications. The satisfactory performance of the vinyl-steel laminates after severe forming operations (see Figure 5) shows that this type of precoated product can be adapted to some conventional fabrication operations.

Decorative appearance is improved by embossing the product in various patterns; the choice of these is unlimited. The vinyl coating is dimensionally stable even when exposed to high temperatures for a short time; for example, by

(*Turn to page 89*)

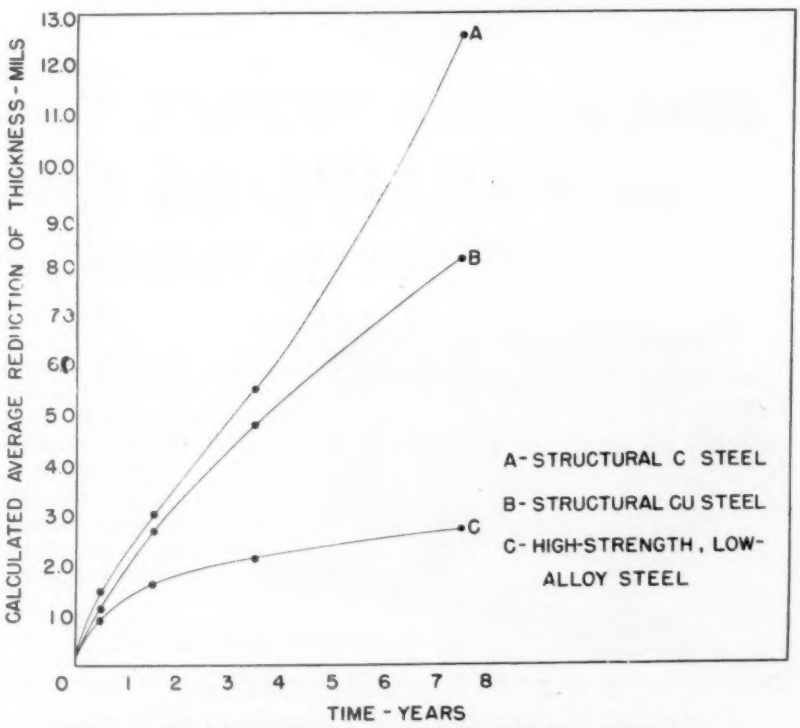

Figure 3. Time-corrosion curves of 3 steels in marine atmosphere.

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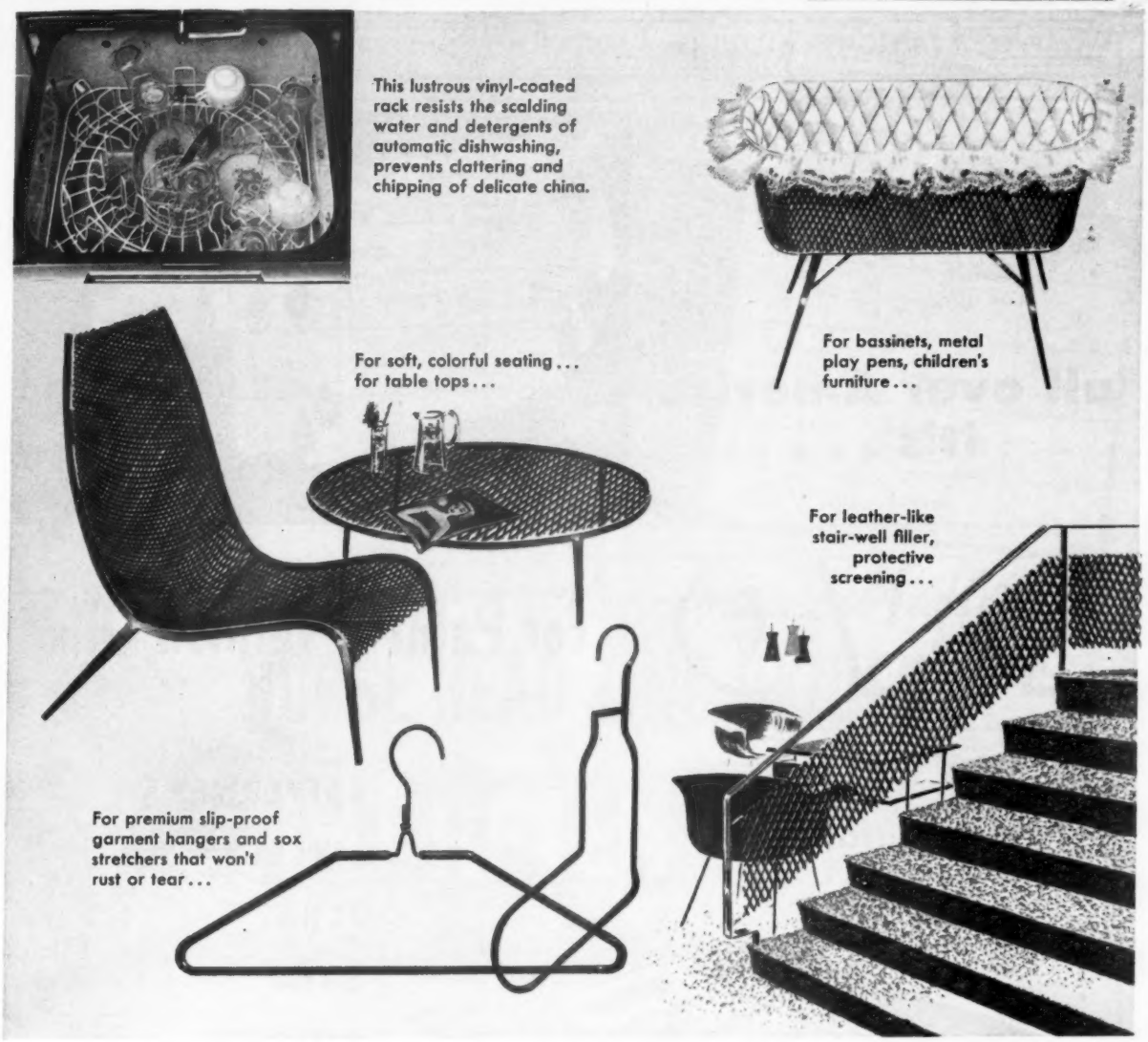
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PHENOLIC RESINS in PROTECTIVE COATINGS

Up-to-date survey of the utilization of phenolic-resin based coatings in a wide range of applications is presented in this article.

By
David M. Fix*

IT is only within recent years that industry has begun to be concerned with the quality of surface coatings, their composition, and methods of application. Raw material suppliers, paint manufacturers, contractors, and maintenance engineers, in co-operation with other fields of engineering have, in the past forty years, made more research progress than in the preceding five hundred years. This progress has been necessary so that coating design could keep pace with other engineering designs which used metal. Most of this progress in coatings is the result of the adaptation, by thousands of paint technologists, of the paint art to the use of synthetic resins.

The past forty years have seen the development and acceptance of a variety of resins for surface coatings. Phenolics, alkyds, vinyls, chlorinated rubber, epoxies, latices—these are some of the materials which have found and are finding new applications every day in the maintenance painting field. Of these, the "granddaddy" of them all—the phenolic resin-based coating—is still the material that will economically solve many of the maintenance problems encountered today. The most important types of phenolic resins used in coatings are:

1. Thermoplastic oil-soluble resins.
2. Thermosetting oil-soluble resins.
3. Thermosetting non-oil-soluble resins.
4. Dispersions

Of these 4 groups, perhaps the most important to the paint manufacturer and ultimate consumer are the resins of the thermoplastic oil-soluble type, the so-called "varnish" resins. The resins which will be discussed in this particular class are exemplified by those based on 3 general phenolic raw materials:

1. Paraphenyl phenol
2. Butyl phenol
3. Amyl phenol

Thermoplastic Oil-Soluble Resins

Of the thermoplastic oil-soluble resins, the paraphenyl phenol type was the first oil-soluble, 100% phenolic resin to be introduced. It was the first resinous material manufactured which, pound for pound, produced coatings of greater durability to exterior exposure than any of the drying oils. It has been proven that a 25-gallon varnish (meaning 25 gallons of oil to 100 pounds of resin) when properly processed will outlast a 35-gallon varnish. The latter in turn will prove better than a 50-gallon varnish, showing that the greater the resin content in relation to the oil, the greater the durability. We might point out, however, that short oil lengths (12- to 17-gallon) are generally considered too brittle for use in areas were temperature changes are frequent and rapid. Long oil varnishes are used for distensibility and lower cost.

A zinc chromate ship primer based on 25-gallon paraphenyl phenol-linseed oil vehicle was used extensively by the Bureau of Ships in World War II. A 12½-gallon varnish based on the same resin and linseed oil has been used successfully on many occasions for exterior use. However, such short oil-length varnishes are generally reserved for those cases where maximum chemical resistance is desired. For most uses, it is generally considered more foolproof to operate in the 25- to 33-gallon oil length range. This is lower in cost, and permits more generous use of low-strength and low-cost petroleum solvents. It also makes a safer varnish with respect to adhesion, compatibility with other vehicles, brushability, and minimized color through oil dilution, while maintaining exceptional durability.

Of the phenolic varnish resins, those based on butyl phenol have shown the best coating characteristics in recent years. Two exposure tests, carried on independently and under different conditions, bear out this statement. In the first instance, a medium oil-length butyl phenol resin-based varnish exhibited the best performance out of 1700 test specimens over a three-year testing period in an exceptionally corrosive industrial atmosphere. Secondly, coatings systems based on butyl phenol resins have shown excellent protective qualities through 10

* Based on a paper presented before the Rolla School of Mines, Rolla, Mo. Mr. Fix is associated with the Bakelite Co.

Table I

VF-1380
PRIMER VEHICLE

Formula	Pounds	Gallons
Bakelite phenolic resin CKR-2103	100.0	11.0
Tung oil	196.0	25.0
Mineral spirits	296.0	45.5
	592.0	81.5

Manufacturing Procedure

Heat the CKR-2103 and tung oil to 450°F. in 45 minutes. Hold at 450°F. about 35 minutes for body. Remove from fire and thin.

Properties

Viscosity.....E
Non-volatile.....50 per cent
Specific gravity.....0.876 (7.3 lb. per gal.)
Color (Gardner).....10

Table II

EF-1564
READY-MIXED ALUMINUM PAINT

Formula	Pounds	Gallons
Aluminum paste	172.0	14.02
VF-1380 (50 per cent N.V.)	589.0	80.64
Mineral spirits	34.0	5.22
6 Per cent cobalt naphthenate drier	1.0	0.12
	796.0	100.00

EF-1564

Properties

Weight per gallon.....7.96 lb.
Non-volatile.....51 per cent
Drying time.....6 hours
Reducing thinner.....Mineral spirits
Application.....Brush or spray
Reduction for application .Reduce with mineral spirits to spray viscosity. May be brushed as formulated above.

years' service on U. S. Corps of Engineers Locks and Dams in the Mississippi and Ohio Rivers.

Vehicles based on butyl phenol resins have eliminated the necessity for costly two-container systems in the packaging of aluminum pigmented varnishes by excellent retention of "leafing" properties over extended storage periods. Test panels have shown that an aluminum paint based on a butyl phenol resin-tung oil varnish that has been stored in a standard paint can for five years stands up very satisfactorily. The vehicle, VF-1380, is a 25-gallon oil-length varnish compounded with "Bakelite" phenolic resin CKR-2103, tung oil, and mineral spirits (see Tables I and II). The excellent properties of the EF-1564 aluminum paint formulated from VF-1380 primer have resulted in its being specified by the State of Illinois for use as an aluminum coating for state-owned bridges.

The durability of phenolic resin-based varnishes has been well established by exposure panels, part of an extensive testing program conducted by Bakelite Company for the evaluation of both resins and specific formulations. Spar varnishes based on two "Bakelite" butyl phenol-type resins, CKR-2103 and CKR-2400 (formerly BR-9400), were coated on maple panels, as were two comparable phenolic varnishes. The panels were exposed for six months in Florida at 45° south. At the end of this time, the test was concluded since the comparison varnishes had become badly checked (see Table III).

Both the 25-gallon tung oil and the 25-gallon alkali-refined linseed oil formulations using the two comparative resins displayed definite checking at the end of four months' exposure. Formulations using phenolic resins CKR-2103 and CKR-2400 showed no signs of checking even after six months' exposure.

In addition, butyl phenol resin-based varnishes are definitely superior in performance and are comparable in cost per pound to alkyd-based finishes. Comparative data on the properties and cost of varnishes based on a butyl phenol resin versus an alkyd coating show in every instance that the butyl phenol resin-based varnishes are superior in drying speed, through-dry, hardness, durability, solvent tolerance, pigment stability, water resistance, and alkali resistance (see Table IV). The price range for the 50% non-volatile vehicles is 14 to 18 cents per pound for the alkyd-based material as opposed to 13 to 17 cents per pound for the butyl phenol-based. High-quality butyl resins give a pale film with excellent weathering

Table III

FLORIDA LAND RACK EXPOSURE RESULTS
Checking of Films at 45° South

Months	CKR-2103	CKR-2400	Comparative resin No. 1	Comparative resin No. 2
	25-GALLON TUNG OIL VARNISHES			
3	None	None	None	None
4	None	None	Definite	Definite
5	None	None	Medium	Medium
6	None	None	Bad	Bad
	25-GALLON ALKALI REFINED LINSEED OIL VARNISHES			
3	None	None	None	None
4	None	None	Definite	Definite
5	None	None	Bad	Medium
6	None	None	Very bad	Bad

Table IV

COMPARATOR
CKR-2103 VARNISHES versus ALKYD-RESIN COATINGS

	CKR-2103 based	Alkyd based
Drying speed	X	
Through-dry	X	
Hardness	X	
Initial color		X
Durability	X	
Color retention		X
Solvent tolerance	X	
Stability with reactive pigments	X	
Gloss retention		X
Water resistance	X	
Alkali resistance	X	
Vehicle cost (at 50 per cent N.V.)	13 to 17 cents per pound	14 to 18 cents per pound

properties, leading to application in porch and deck enamels, and clear finishes for house sidings.

Two 33-gallon tung oil CKR-2400 vehicles, VF-1823, a spar varnish, and VF-1251, a clear finish, are economical from both a raw materials standpoint and from the standpoint of durability of their coatings (see Tables V and VI).

In the maintenance field, phenolic resin-based coatings have proven their value through the years. UF-1548, based on an amyl phenol resin 25-gallon tung oil varnish, is one of the best general-purpose maintenance primers for atmospheric exposure. The pigment composition of this primer is 59.5 per cent dry red lead, 10 per cent zinc chromate and 5 per cent zinc oxide with the remaining 25.5 per cent consisting of fillers. This primer, which can be used for fresh water as well as atmospheric maintenance, has a pigment volume ratio of 40 per cent. Compared with a standard red lead in oil primer, UF-1548 is equal in

Table V

VF-1823
SPAR VARNISH

Formula	Pounds	Gallons
Bakelite phenolic resin CKR-2400	100	11
Tung oil	256	33
Mineral spirits	293	45
	649	89

Manufacturing Procedure

Heat CKR-2400 and tung oil to 450°F. and hold about 35 minutes for body. Remove from fire and thin.

VF-1823

Properties

Viscosity	E
Non-volatile	55 per cent
Specific gravity	0.887 (7.4 lb. per gal.)
Color (Gardner)	8
Driers	0.2 per cent lead, 0.02 per cent cobalt, and 0.01 per cent manganese as metals based on the weight of oil present.
Drying speed	1 hour —Tacky set to touch 2 hours—Slight tack 3 hours—Tack free 4 hours—Print free
Gas checking in bell jar	None
Skinning in half full 8 oz. jar	2 weeks—None

Table VI

VF-1251
CLEAR FINISH FOR SIDINGS

Formula	Pounds	Gallons
Bakelite phenolic resin CKR-2400	100	11
Linseed oil	85	11
Tung oil	164	21
Refined castor oil	8	1
Mineral spirits	280	43
	637	87

Manufacturing Procedure

Heat the resin and linseed oil to 560°F. in 30 minutes and hold 20 minutes for body. Check with the tung oil to 370°F. in 10 minutes and hold about 40 minutes for body. Add refined castor oil, then water-cool, and thin.

VF-1251

Properties

Viscosity	D
Non-volatile	56 per cent
Specific gravity	0.890 (7.41 lb. per gal.)
Color (Gardner)	10
Driers	0.3 per cent lead, 0.03 per cent cobalt and 0.015 per cent manganese as metals based on the weight of oil present
Drying speed	1 hour —set to touch 2 hours—slight tack 4 hours—very faint tack 6 hours—dry—print free
Resistance to 5 per cent sodium hydroxide at 20°C	3 hours—good
Skinning in half full 8-oz. jar	2 weeks—none
Zinc oxide reactivity	None
Gas checking in bell jar	None
Kau rireduction	Passes 120 per cent—fails 130 per cent

protection and superior in resistance to dirt collection under atmospheric conditions and vastly superior in underwater applications. In addition, the phenolic primer dries faster, thereby permitting a shorter recoating schedule, and has less tendency to settle during storage (see Table VII).

A striking example of the type of performance obtained from phenolic resin-based vehicles over masonry is shown by the fact that 64,000 square feet of concrete flooring at the Coca Cola Bottling Company's St. Paul, Minnesota plant were coated with a maroon enamel, air-dry finish based on phenolic resins. After five years, the company reported that the coating was still in excellent condition, showing less than 10 per cent wear. Application was made by wet-buffing the enamel into the set cement with a rotary, steel wool, floor brush. By this method, large areas were coated quickly, and a deep-seated, durable finish was produced. Part of the 64,000 square feet is in the production plant proper, where it is subjected to the traffic of bottling operations. The remaining area includes truck-washing stalls, loading platforms and vehicle storage space.

The most recent innovation in the phenolic coatings field has been the introduction of the "cold-mix" technique of varnish manufacture. This cold-mix technique is unique with "Bakelite" butyl phenol resin CKR-2400 and eliminates the necessity for paint

Table VII

UF-1548
PRIMER

Formula	Pounds	Gallons	Percentage by weight
97% Dry red lead	587.0	7.92	37.94
Zinc chromate	98.7	3.37	6.38
Zinc oxide	49.3	1.04	3.19
Mica (water-ground)	98.7	4.32	6.38
Magnesium silicate (fibrous)	147.0	6.19	9.50
Aluminum stearate	4.7	0.56	0.30
VF-10248 (58% N.V.)	496.5	66.80	32.10
Mineral spirits	58.0	8.93	3.75
24% lead drier	2.3	0.24	0.15
6% cobalt drier	0.6	0.08	0.04
6% manganese drier	0.6	0.08	0.04
Anti-skinning agent	3.6	0.47	0.23
Theoretical yield	1547.0	100.00	100.00

Pebble mill grinding procedure: Grind the pigment in all the vehicle until a good dispersion is obtained.

Percentage composition (by weight):

Pigment — 63.7%

	Per cent
Dry red lead	59.5
Zinc chromate	10.0
Zinc oxide	5.0
Mica	10.0
Magnesium silicate	15.0
Aluminum stearate	0.5
	100.0

Vehicle — 36.3%

	Per cent
VF-10248	87.20
Mineral spirits	11.65
Driers and anti-skin agent	1.15
	100.00

Drier content: 0.3% lead, 0.02% cobalt and 0.02% manganese as metals, based on the weight of oil in the VF-10248.

Properties

Weight per gallon	15.47 lb.
Pigment volume ratio	40%
Non-volatile	82.4%
Viscosity	82 Krebs units (200 gr. wt. at 77°F.)
Gloss	47 on 60° glossmeter
Drying time	Set to touch—1 hour. Dry — overnight.
Reducing thinner	Mineral spirits
Reduction for spray	To 1 gallon of paint, add 1 qt. of mineral spirits
Brushing	May be brushed as packaged

manufacturers to use cooking facilities in varnish preparation. Essentially, a solution CKR-2400 is prepared, and an appropriate amount of drying oil (or oils) is added to the resin solution, followed by driers. Exposure tests have shown that the resulting varnish prepared by the cold-mix method is equal in durability to cooked varnishes. In pigmented composition cold-mix vehciles produce far more gloss than do cooked varnishes. Suggested applications for this type of coating are porch and deck enamels, and linoleum overprint varnishes.

Thermosetting Oil-Soluble Resins

The thermosetting oil-soluble resins are similar in appearance to the non-heat-reactive type, with melting points ranging from 190 to 225 deg. F. Due to the violent reaction of these resins, accompanied by foaming, they are seldom used alone for air-drying applications, since there is not time for the drying oils to sufficiently polymerize and thus to bring out the durable properties of the coating. The final body obtained in such varnishes is due chiefly to the viscosity of the polymerized resin and not the oil.

These resins are, however, used to very good advantage in air-drying and baking formulations be allowing their reactivity to be spent on less activy resins, such as rosin, ester gum, the various pentaerythritols and natural resins such as Congo. The best results of increased melting point, drying speed, water resistance, and durability in such combinations are achieved by heat-treating at from 350° to 500°F. in the absence of drying oils, or with only a small amount of oil in the initial cooking reaction. Then the remaining oils in the formula are added for processing to the desired viscosity and solids in the usual manner. In this fortifying work, the 100% phenolic resin content may vary from 5% to 50%, according to the nature of the other resins and the end product required.

On the other hand, where the coating is to be baked, some very interesting finishes are being produced using the heat-reactive resin alone with drying

Protective aluminum coatings based on phenolic resins are used on freight cars.

oils. These include clear tin-plate coatings and pigmented goods for product priming and finishing where the desirable properties of the phenolics are necessary. Short oil formulations, generally from 8 to 15 gallons in length, are used. Another interesting specialty use for the 100% heat-reactive resins involves their combination with blown oils. Such short oil-length varnishes cure homogeneously in thick sections under the further application of heat. This type of coating finds application in deep curing electrical insulating and coil impregnating varnishes.

Thermosetting Non-Oil-Soluble Resins

Before covering thermosetting non-oil-soluble resins or phenolic baking solutions, some explanation is needed. When phenol-aldehyde resins are made by the usual condensation process, the operation may be interrupted to give three distinct and useful variations of a given formula. When the reaction is halted at a certain point after having progressed to some extent, the hard, brittle resin resulting therefrom can be dissolved in alcoholic solvents and then may be further thinned with esters and ketones. It will also readily melt again. This is known as the "A" stage.

Instead of stopping at this point, the reaction may be carried further, advancing the resin to what is known as the "B" stage. Here, the resin is no longer soluble in the common solvents, but it will still soften to quite some extent for a short period of time upon the further application of heat. In other words, it is now insoluble and only partially fusible. When the reaction is carried still further under controlled conditions to the final, or "C" stage, the resin becomes completely insoluble and infusible. The transparent amber-colored pipe stems, among the first phenolic plastic products on the market, can be taken as an example of the "C" stage, although for practical reasons they are not polymerized to the very limit.

The phenolic resin-baking finishes are made by cutting the run with solvents at a carefully selected point between the "A" and "B" stages. After application by spray or dip methods to the metal to be protected, the baking operation at temperatures from 275° to 375°F. polymerizes the film-forming solids through the "B" and finally to the "C" stage. At the higher temperatures, the curing time is only a matter of minutes for the thin films used.

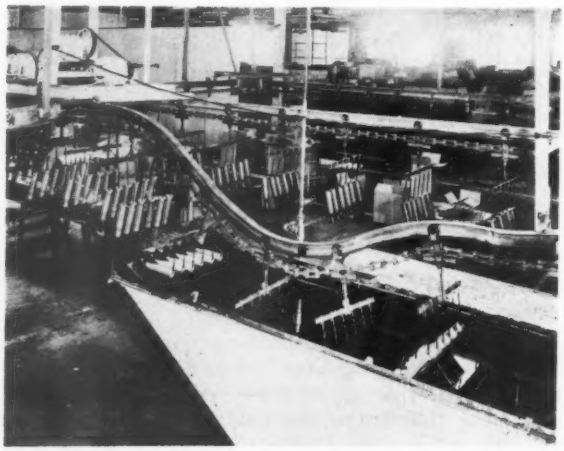
Such baked films have many outstanding properties. They are unaffected by long exposure to any of the commonly used solvents, including acetone and ether; they have excellent resistance to dilute organic and many mineral acids; and unusual heat resistance below the carbonization point of organics. Their resistance to water immersion and weathering is also exceptional. Another variation includes low temperature (140°-150°F.) baking resins for use on wood.

Such films may be used clear as in the case of steel shell cases, or they may be pigmented with iron oxide, silica, or other inert materials for use in primers, and high heat-resistant color pigments for use in finishing coats. These coatings are almost glass-hard, and have relatively little flexibility. For that reason they are applied to relatively rigid metal, such as the interior of steel storage tanks, portable containers, chemical equipment, etc.

Application is generally by spraying or dipping. Since the heat of baking completes the chemical reaction in the film-forming solids to the "C" stage, some gassing results. Thus the films must be applied thin enough to permit these gases, as well as the volatilized solvents, to escape without causing excessive pinholing or blistering. To ensure a continuous film, from two to six coats are generally applied, each ranging in thickness from 0.5 to 0.75 mil. The undercoats are under-baked, depending upon complete polymerization in the final bake. This also serves to knit the several coats together. The final protective coating system is still thin enough so that it can take the expansion and contraction of large sections of metal brought about by temperature changes—without checking or cracking of the baked film.

In order to have excellent adhesion, the metal surfaces to be coated must be perfectly clean. Sandblasting is preferable, although acid etching has been successfully used for the smaller parts. A pigmented primer gives superior results on iron and steel with respect to distensibility, adhesion, and abrasion resistance.

It is interesting to note that the refining of raw materials used in this type of resin-baking coating



Shell casings protected with heat reactive phenolic varnish during World War II when black steel was used.

can be carried to the point where certain grades are perfectly free of taste and odor after the films are baked, so that the interior of storage tanks for wine, beer, milk, cheese, and other food products can be satisfactorily protected.

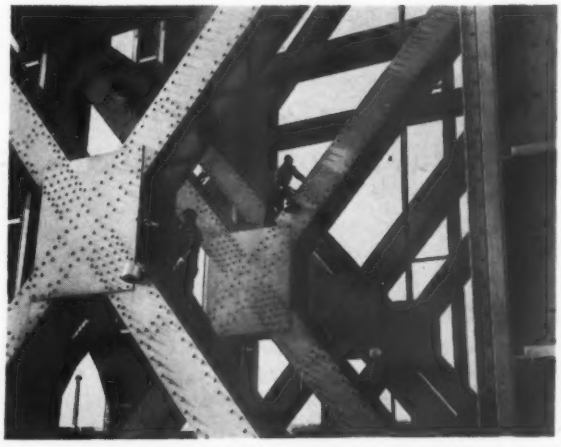
The interiors of railroad tank cars have been very successfully lined in this way for many years. In such large equipment, polymerization of the resin solids is accomplished by means of hot air blowers. For smaller equipment, ovens, infrared and electrical induction methods have been satisfactorily used. Part of a fleet of 47 Shippers Car Line Corporation tank cars, capable of transporting 376,000 gallons of wine, were coated with a phenolic resin-baking coating. After each trip the cars were sterilized with live steam, without perceptibility harming the coating.

The high degree of resistance of these resin-baking finishes to corrosion, abrasion, and chemical attack may be illustrated by some of the severe tests of the various Army and Navy specifications which are met by these materials. Some of these unusual test requirements are given here in abridged form: "The films shall withstand one hour's immersion in boiling toluene, one hour in glacial acetic acid at room temperature, one hour in 10% ammonium hydroxide, one hour in ethyl alcohol, and one hour in ethyl ether without softening or other evidence of deterioration."

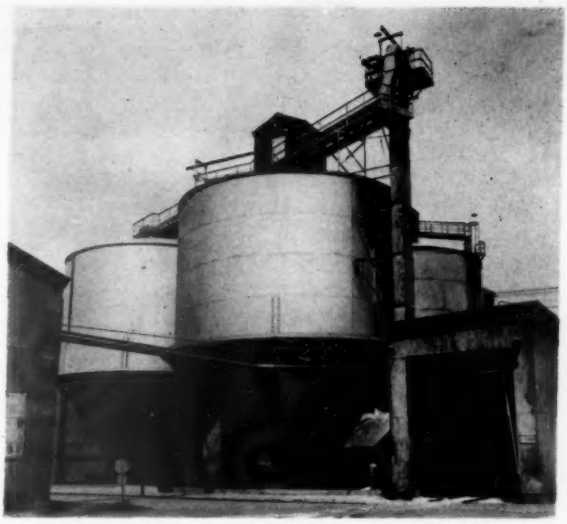
"Coated panels, having diagonal cuts through the film shall be exposed to twenty-four hours of continuous salt spray at 60°-80°F. At the end of this exposure, there shall be no evidence of rusting other than within 1/8 inch distance from the scribe marks on edges of the panel." "Coated panels, at a 45° angle, shall withstand the abrasive action of 5 liters of Ottawa sand (20-30 mesh) dropped through a verticle tube 3 feet long."

"Films of 0.3 to 0.5 mils thickness on steel shall withstand exposures of at least ten days to salt spray and show no corrosion or spread of corrosion beyond that in the scratches in the finish and there shall be no other evidence of deterioration."

"Coated steel panels, having film thickness of 0.3 to 0.5 mils shall withstand immersion for not less than seven days at 95°-100°F. in a two-layer liquid consisting of a 3% solution of sodium chloride in water



Phenolic coatings being applied to structural steel.



Phenolic chemical resistant coatings for industrial equipment.

and 40% aromatic hydrocarbon fluid with no evidence of film failure or corrosion."

Other specification tests call for 5000 hours' immersion in moving sea water, 5000 hours in lubricating oil at 200°F., 5000 hours in acetone, alcohol, boiling water, gasoline and toluene. The phenolic resin baking finishes are the only organic coatings that we know of which will stand up under such severe treatment.

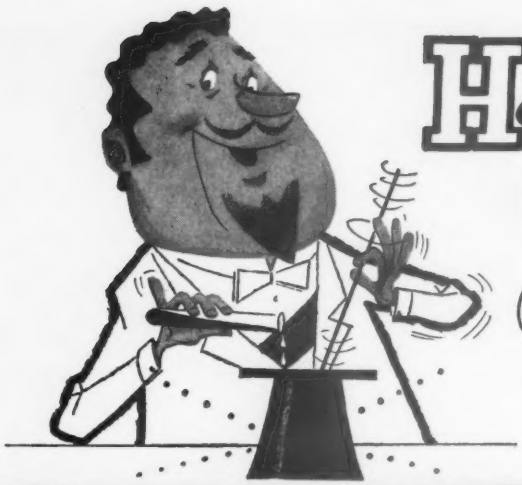
An interesting use of one phenolic resin-baking solution depends on its ability to meet the requirements of Ordnance Department Specification, MIL-V-12276, for a military shell-case coating. The finish protects the steel from corrosion, resists a wide variety of climatic conditions, and is strong and tough enough to withstand the rigors of transportation to the front lines. The non-softening coating allows the shell to be ejected easily, yet is flexible enough to stand the sudden expansion and contraction that occurs during firing.

Dispersions

The dispersions are an interesting variation of the oleoresinous film-forming materials. They are essentially short oil-length varnishes which have been highly gelled under carefully controlled conditions before dispersing in solvents. They are formulated into non-oxidizing coating materials which dry entirely by solvent evaporation, thereby depositing tough, resistant, continuous films on metal, wood, concrete, wall board, and other surfaces. These coatings give a smooth finish within five minutes or less and can be handled, stacked, or recoated at that time. They are widely used as protective coatings for aircraft, industrial machinery, household appliances, and all types of structures such as dams, locks, and bridges. Used effectively as primers on rough or smooth surfaces, they can be formulated to provide superior sealing, filling, and caulking compounds, traffic paints, and non-skid floor coatings.

Improved traffic paints formulated with these dispersions, having drying times as low as 15 minutes,

(*Turn to page 93*)



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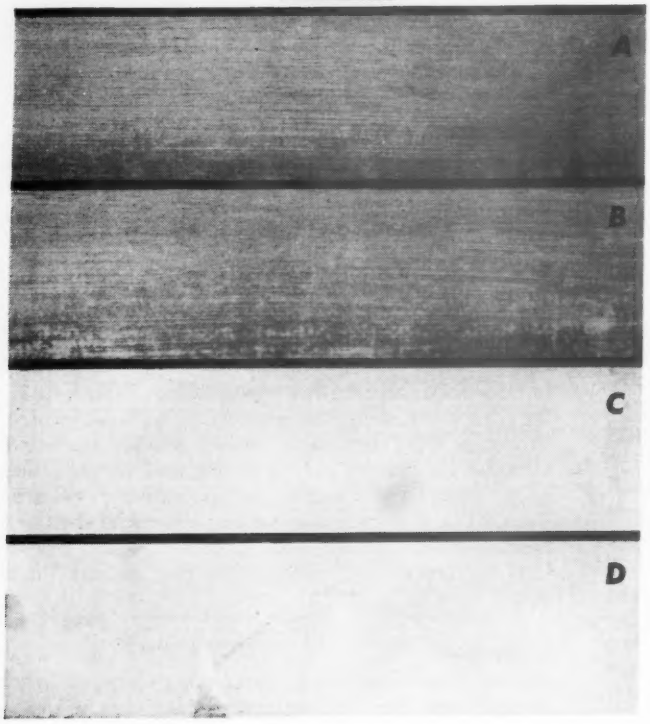

Here's the proof!

You don't need a microscope to see the *difference* in this set of paint panels. Yet, each panel was painted with house paint formulated in linseed oil vehicle at *constant pigment concentration.* Each was exposed, side by side, for fifteen months in an area of heavy mildew growth. Then why the big difference?

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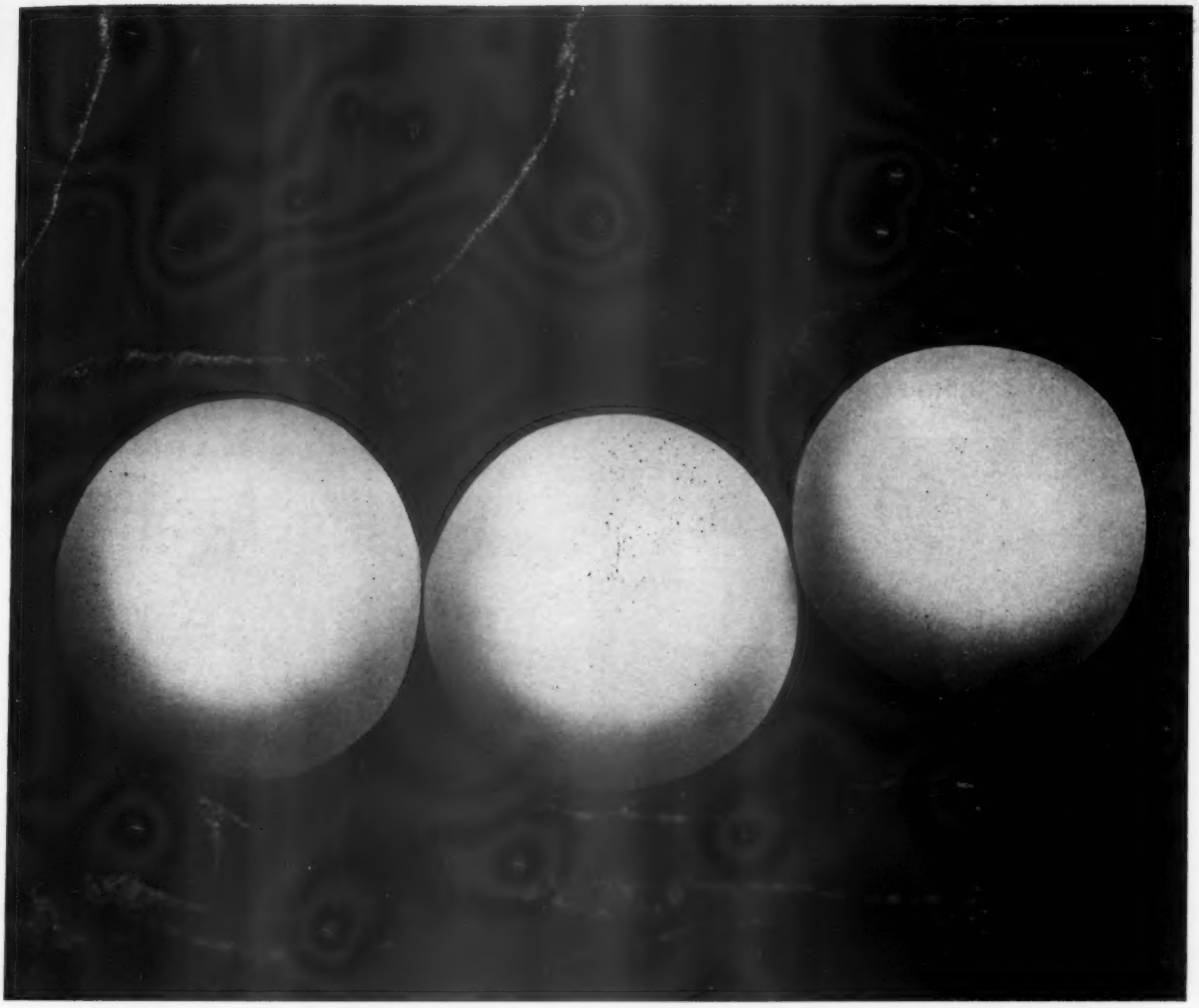

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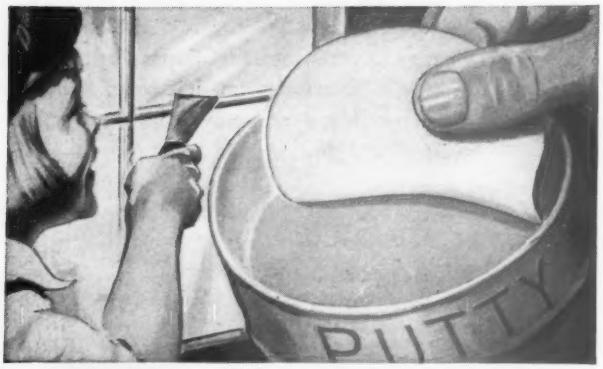

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ANOTHER CELANESE FIRST. *The ball in the picture owes its mirror-like reflection to a new High-Gloss Water-Based Paint, a goal of paint chemists since the first latex paints were introduced—a goal they can now fulfill through Celanese.*

High Gloss! NOW A REALITY WITH HQ* CELANESE PVAc EMULSIONS!

Celanese Corporation of America announces the development of an emulsion and formulations for the commercial production of High-Gloss Water-Based Latex Paint — nonflammable, quick-drying, free from objectionable odor.

Field tested for close to two years and first exhibited in development stages in October 1955, this new high-gloss formulation opens up a range of new and important uses for latex paints in automotive, appliance, and in many other industrial areas.

The secret behind this formulation lies partly in selecting the proper wetting agents and protective colloids, and particularly in the development of a tailored emulsion possessing resin particles of extremely fine size.

So fine are these particles that 31 billion of them can be contained on the head of an ordinary straight pin. When formulated into paint and stored in cans, they remain discreet particles. However, when the paint is spread, and the water evaporates, these particles fuse in minute's time to form a tough, durable, high-gloss surface.

If you've been following the development of High-Gloss PVAc Paint, you'll be interested in more information. Contact your Celanese representative or write Celanese for the complete fine-particle-size story behind this development, as well as the production of high-quality, low-cost flats.

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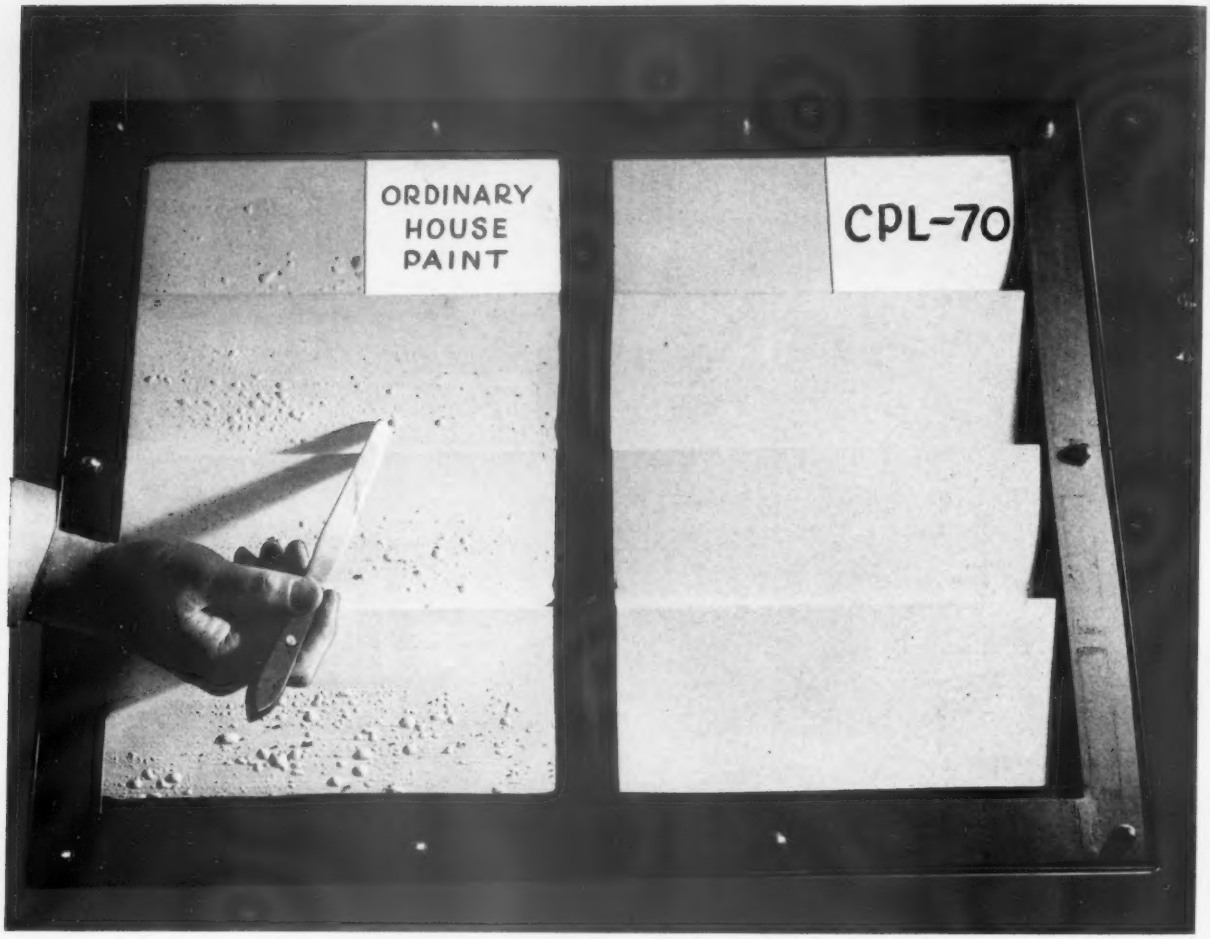

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NATURAL RUBBER IN PROTECTIVE COATINGS

By
Dr. Adolph Heck*

AGES ago, the Indians of South America used a substance derived from certain trees of the tropical forests for its "waterproofing" and "elastic" properties.

They called the substance "cahuchu," meaning "weeping tree" in the Indian language. This word is still in existence in many countries to describe natural rubber as "caoutchouc." In other countries it is called "rubber," a word coined by Priestly about 1770.

"Natural Rubber," as we will call it in this discussion derives from the sap of a tree called "Hevea brasiliensis," which grows wild in the tropical forest of Brazil.

From the beginning of the 20th century rubber trees were planted in ever increasing quantities in South Asia, Ceylon, Maylaya, Sumatra and other tropical countries. Although there are quite a number of trees and plants on the earth which produce a sap similar to Hevea brasiliensis, Hevea brasiliensis is the source of practically all the natural rubber used today.

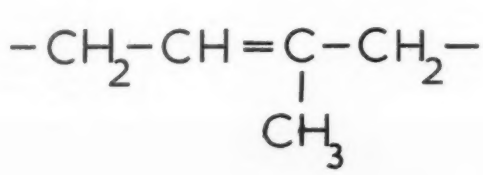
The procedure used in rubber plantations to extract the latex from the tree is similar to the procedure used for the collection of rosin and turpentine from our Southern Pine trees. The white latex consists of from 30-36% rubber hydrocarbon, .30-.70% ash, 1-2% proteins, 2% resin and .5% quebrachitol, dispersed in 62-70% water.

It is interesting to note that the composition of the rubber latex does not only vary in the various parts of a tree, but also depends on the season, the soil the tree is growing in, and the latitude of the place of growth.

It is beyond the scope of this paper to describe the means and ways of treating latex for shipment to almost every industrial country on this earth, and how crepe rubber and smoked sheet rubber are prepared. We would rather concentrate our thoughts on the chemistry of this unusual high polymer and its value for the protective coatings Industry.

Chemical Structure

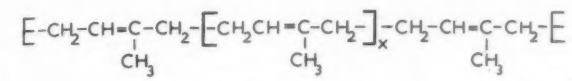
The building block of natural rubber is isoprene of the general formula:



and it can be determined that 95% of the molecules consist of this building block. A small portion of the

*Alkydol Laboratories, Inc.

macro-molecule very likely, according to the present status of information on the subject, contains other constituents. Synthetic Isoprene rubber however, consists of 100% Isoprene molecules. Staudinger gives the following formula for natural rubber hydrocarbon:



(X = 2000-5000, E = unidentified terminal groups.)

He further states that these macromolecules are branched, having a few long chain branches which appear to be responsible for the excellent elastic properties of natural rubber. Synthetic rubber, which is not as elastic as the natural product, has numerous short chain branches thus accounting for its different properties. Rubber derived from natural latex is not a homogenious product. By means of solvent extraction, it can be separated into lower and higher molecular fractions. The lower molecular parts are somewhat soluble, whereas the higher molecular parts are of more limited solubility. Due to this limited solubility, rubber cannot be used in practical protective coatings. After countless attempts it was realized that rubber had to be solubilized to make it suitable for protective coatings while maintaining as much as possible its most valuable properties such as elasticity and chemical resistance.

Solublizing Rubber

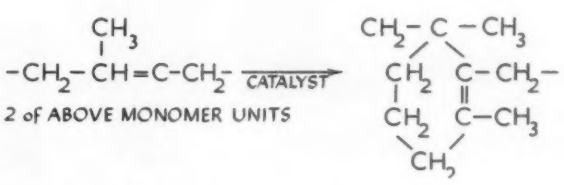
Now let us see how rubber was made soluble and what usable products finally resulted.

In the experimental work of early investigators, natural rubber was heated, milled, dissolved and treated under all kinds of imaginable conditions, reacted with practically every kind of chemical available, and it was found that substitution, catalytic cyclization and decomposition could lead to a number of commercially valuable products.

From the products which may result from the many reactions possible, only three have obtained commercial importance, namely Cyclo-rubber, Chlorinated rubber and Rubber hydrochloride.

Cyclo Rubber

It was not until 1927 that a practical method was worked out by Bruson, Sebrell and Calvert (2) to produce a soluble rubber derivative which uses as catalyst the chlorine salts of certain metals. The original ideas of this work however, date back to 1854 when Duvivier and Chaudet (3) reacted rubber in the present of halides of sulphur, boron, tin and antimony. It is now generally recognized that the change of configuration under the influence of stannic chloride can be presented by the following general type reaction:



Bruson (2) describes the mechanism of cyclization of rubber under the influence of tin as a catalyst.

Structures for cyclo-rubber were proposed by other investigators such as Staudinger & Kirchoff.

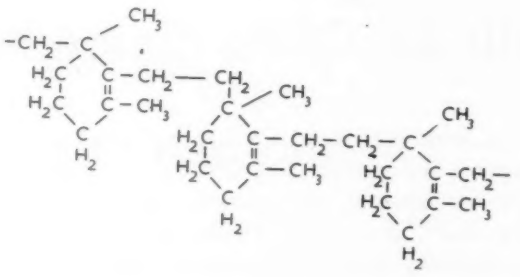
After this work metal chloride cyclicized rubber carrying trade name "Pliolite N.R." was introduced to the coating materials industry. It took almost ten years before a further step towards a usuable cyclicized rubber for surface coatings was made.

German Development

A. Greth and J. Reese announced in 1936, through a German patent application, the development of a new and different type of Cyclo-rubber. In 1937 a U. S. patent application was filed leading to USP 2,200,715 (5).

The process described by A. Greth and J. Reese led to an isomerization of natural rubber of far reaching significance. The product obtained important usages not only in Europe, but also in the United States and Canada. It is marketed under the name of "Alpex" (6) and characterized by a number of outstanding properties. This resin is a very hard hornlike substance. It is non-acidic in nature, and soluble in aliphatic hydrocarbons. It is compatible with drying oils, alkyds, oleoresinous varnishes, hard resins and most known plasticizers. Its outstanding properties are chemical resistance, light and color stability, heat resistance, a high order of adhesion to all kinds of metals, a wide range of pigment compatability and the formation of stable solutions in regular and odorless mineral spirits.

The formation and chemical structure of this type of cyclicized rubber was suggested in 1947 by J. D. D'Ianni (7), G. J. van Veeren in 1950 (8) and J. Reese in 1955. At the present time, it is generally recognized that the structure of the Cyclo-rubber "Alpex" can be presented as shown below.



Literature References

(1) H. Staudinger *Macromolecular Chemie and Biologie* (1947) 42. Wepf Company. Basel, Switzerland.

(2) H. A. Bruson, *Industrial Eng. Chem.* 19, 1033 (1927).

(3r F. Marchioma, *Latex-Rubber Derivatives, Rubber-Age.* (NY) 1313 (1937).

(4) K. Memmler, *Science of Rubber.* Reinhold (NY) (1934).

(5) U.S.P. 2,200,715 (1940).

(6) Reg. Trade mark "Alpex".

(7) J. D. D'Ianni et al *Ind. Eng. Chem.* 38, 1171-1181 (1946).

(8) G. J. van Veersen, *Recueil des travaux chemiques des Pays Bas.* T 69, 1365-81, 1950.

(9) J. Reese, *Farbe und Lack,* 502 (1955).

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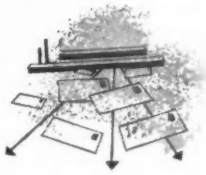

Because inquiries can smother in piles of paper, our inquiry processing is fast and thorough. A complete Customer Service Department has full responsibility for preparing specifications to your requirements, formal quotations, order entering, and the processing of sales correspondence and relative communications. (May we have your inquiry?)

WE BELIEVE IN KEEPING DELIVERY PROMISES

The whole Patterson organization becomes part of the promise when a delivery date is made. Fallibility is human, but we set our sights squarely on the target's bull's-eye from the day the promise is made—and our score is close to perfection today. (When do you need that new equipment?)

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NEWS

Ship Large Navy Order

Reichhold Chemicals, Inc., began delivery in June of one of the largest single orders for alkyd resin in recent years to the U. S. Navy.

Tank cars waiting to be filled with alkyd resin at Reichhold Chemicals, Elizabeth, N. J., plant for shipment to the Norfolk Navy Yard, Portsmouth, Va.

Some 60 tank cars of alkyd resin for paint, weighing approximately 3.6 million pounds, comprise the total order. Two million pounds were to go to the Navy's plant at the Norfolk Navy Yard, Portsmouth, Va., and 1.6 million pounds were scheduled for the Mare Island Navy Yard, Vellejo, Calif.

The resin, P296-60 Beckosol, is used in maintenance paints for ships. Delivery within 105 days was specified in the order.

•

New Lab for Du Pont

Du Pont's explosives department has established a new sales development laboratory at Carney's Point, N. J., the firm has announced. The laboratory had been temporarily located at the Eastern Laboratory, Gibbstown, N. J.

The new unit is concerned with the department's chemical products such as cellulose derivatives, nitrogen compounds and polymer intermediates. Its primary objectives will be to provide customers with technical service in the use of existing products, to find new uses for existing products and to develop markets for new products.

Robert N. Gartside is the laboratory director.

Workman Receives Fellowship

A Sloan Fellowship for participation in the executive development program at Massachusets Institute of Technology has been awarded to R. E. Workman, manager of the chemical division of the Goodyear International Corp., a subsidiary of the Goodyear Tire and Rubber Co.

R. E. Workman

Mr. Workman is one of 36 men chosen from a wide range of industrial concerns throughout the United States, Canada and Mexico, who began the one-year program last month.

The program will give the group an opportunity to view long range development of business in the perspective of technological advance, as well as within the economic and human framework of management problems. The program emphasizes orientation to fundamentals underlying management action.

Mr. Workman has been with Goodyear since 1942, starting with the research division as a chemist. In 1952 he was appointed manager of commercial development, and was made assistant to the general manager of the chemical division in 1954. He became manager of the division this year.

Mr. Workman is a graduate of the Case School of Applied Science, where he received a B.S. in Chemical Engineering. He is a member of the American Chemical Society, American Institute of Chemical Engineers, Chemical Market Research Assoc., and Society of Plastics Engineers.

•

Office Execs Elect Bunce

Earle G. Bunce, office services manager of the dyestuff and chemical division of General Aniline & Film Corp., has been elected president of the Office Executives Assoc. of New York at the organization's annual meeting.

Mr. Bunce became a member of OEA in 1948, and served last year as executive vice president. He previously held the offices of vice president of programs and meetings, of membership and of public relations.

Zinc Institute Elects

S. D. Strauss, vice president and manager of sales, American Smelting and Refining Co., has been elected president of the American Zinc Institute.

Three vice presidents were also elected at the annual meeting of the Board of Directors. The new officers are J. D. Bradley, the Bunker Hill Co.; Clarence Glass, Anaconda Sales Co., and H. L. Young, American Zinc Sales Co.

E. V. Daveler, American Zinc, Lead and Smelting Co., was re-elected treasurer, and J. L. Kimberley will continue as executive vice president and secretary.

•

Zettlemoyer Tours Europe

Dr. Albert C. Zettlemoyer, 1957 Mattiello Memorial Lecturer for the 35th Annual Meeting of the Federation of Paint and Varnish Production Clubs, has recently returned from a four-week trip to technical conferences in Europe under the auspices of the U. S. Navy.

Dr. Zettlemoyer is research director of the National Printing Ink Institute and professor of Chemistry at Lehigh University.

He represented the Institute at the Fourth International Conference of Printing Research Institutes at Munich, Germany, late in May. He presented three papers at the Conference, and later delivered lectures in England at Bristol, Liverpool and Cambridge Universities.

Dr. Zettlemoyer also visited schools, research institutes and printing ink companies in Germany, Holland and England.

•

Wins Nopco Scholarship

Charles A. Zebeau of Cedartown, Ga., is the winner of the Charles P. Gulick Scholarship presented by the Nopco Chemical Co. each year to a son or daughter of a Nopco employee.

Candidates are judged on a basis of scholastic achievement, financial need, character and well rounded personality by a committee of three educators. The scholarship has a value of $750 per year for four years at the college of the recipient's choice.

This year's winner is the son of Ernest Zebeau, production foreman at Nopco's Cedartown plant.

NEWS

Nominations Opened for Glycerine Awards

Nominations have been opened for the sixth annual Glycerine Research Awards, it has been announced by E. Scott Pattison, manager of the Glycerine Producers' Assoc.

The awards were established to recognize and encourage research leading to new and improved applications of glycerine or glycerine derivatives to products and processes. Originality in extending the use of glycerine to new fields receives special consideration.

First award is $1,000 and an honor plaque. Second award is $300, and the third award is $200. Awards are to be presented at the annual meeting of the Glycerine Division, Association of American Soap & Glycerine Producers, Inc., at the Waldorf-Astoria Hotel in New York next January.

Entries may be concerned with the chemical, physical or physiological properties of glycerine, or with properties of glycerine-containing or glycerine-derived materials. Entries may deal with applications which are of themselves currently or potentially of value to industry or the general public, or they may deal with scientific principles or procedures likely to aid future application.

The awards are open to any individual in the United States or Canada engaged in research, whether employed in industry or affiliated with a governmental or educational institution, except those connected with member companies of the Glycerine Division.

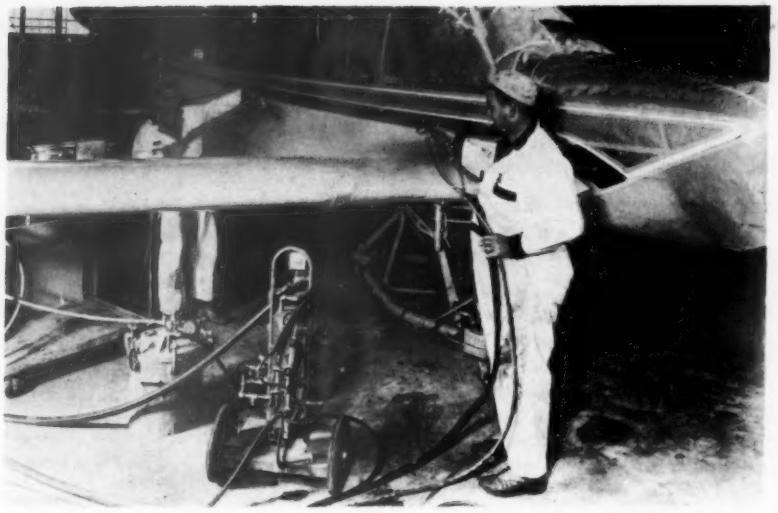
Joint entries by research teams or associations of two or three individuals are also eligible.

•

Pittsburgh Agent Named

The Menhaden Fish Products Co. has announced the appointment of John D. Butts as a company agent in the Pittsburgh vicinity.

Mr. Butts will handle the firm's line of processed fish oils and isophthalic alkyds.



PLANES HOT-SPRAYED: Ohio Aviation Co. at Dayton Municipal Airport paints planes to all specifications regardless of color or pattern. A DeVilbiss portable heating unit is used with the spray gun, with substantial savings and reduced painting time the result.

German Delegation Visits American Paint Facilities

A delegation of German paint and varnish executives recently completed a tour of the United States, focusing their attention on paint processing plants in the Southern California area.

The delegation gathered information on techniques, applications, raw materials and equipment as part of an effort to revitalize the once-flourishing German paint industry, which was destroyed during World War II.

Particular interest was shown in U. S. developments in aircraft protective coatings, due to Germany's reentry into the manufacture of commercial and military aircraft. Interest was also shown in the application of new types of resins and in polyvinyl acetate.

At Occidental College the group observed definition and testing of adhesion by Dr. Reed Brantley, who has developed new techniques and equipment. An adhesion testing device developed in Germany was discussed by the delegation.

The group viewed merchandising aspects of colors at the Los Angeles plant of W. P. Fuller & Co., and studied compact production techniques at the plant of Benjamin Moore & Co.

Production of PVA emulsion paints for interior and exterior application was examined at the home of Vi-Cly Industries, and attention was turned to automatic handling of wet and dry materials and finished products at the paint division of Pittsburgh Plate Glass Co.

In return for information gathered here, the German delegation left American processors with ideas developed during the war, which had been guarded until German patent rights were restored. Officials of U. S. concerns stated that they received as much as they gave during the tour.

•

Add Research Facility

L. Sonneborn Sons, Inc., has doubled research facilities at its Petrolia, Pa., refinery with the addition of a new laboratory building to its plant there.

The new building has been named the Breth Laboratory in memory of the late Ferdinand W. Breth, technical director of the company for many years.

The new laboratory extends the firm's efforts in four major product fields, including white mineral oils, petrolatums, microcrystalline waxes and petroleum sulfonates.

•

Appoint N. Y. Representative

T. F. McAdam has become the Metropolitan New York area representative of Honeymead Products Co. of Mankato, Minn.

The firm produces soybean oils trade named "Clearsoy" and "Lustersoy." Mr. McAdam's offices are at 26 Broadway, New York 4, N. Y.

NEWS

BEGIN NEW WING: Sketched portion at upper left of photo shows the size and location of the new polymer laboratory now being constructed at Air Reduction Co.'s research laboratories at Murray Hill, N. J. The new structure, scheduled for completion by the end of 1957, will cost more than a half-million dollars.

Paint Program Interest High

More than 650 communities and organizations in 48 states, Alaska and the Philippines have shown interest in the "Painting the Town" paint promotion sponsored by Archer-Daniels-Midland.

The program was begun by ADM last year to show towns how they might increase store traffic and boost trade by adding life to their business districts with a new coat of paint. Several paint manufacturers are also actively supporting the program, according to James W. Moore, ADM vice president and director of marketing.

A $1,000 first prize is to be awarded to the community carrying out the best program. A second prize of $500 and a third prize of $250 will also be given. The 1956 winner was Carl Junction, Missouri.

•

Aerosol Production Up

An annual production record of 320 million units for 1956 has been reported for the aerosol industry by the Chemical Specialties Manufacturers Assoc.

The 1956 production enabled the 11-year-old industry to top the billionth package mark late in the year. Retail-valued at approximately $320 million, the 1956 production was 33 per cent ahead of the previous year, the Association reported.

Pigmented and metallic paints and clear plastic sprays increased sharply in 1956, according to the report. The 1956 production of more than 22½ million units more than doubled the 1955 figure.

The CSMA survey was based on reports by 80 loaders of aerosol products.

•

New England Agent Named

Lukens Chemical Co., 227 California St., Newton 58, Mass., has been named sales representative of International Talc Co., according to S. W. Tuttle, vice president of International Talc.

The sales firm will cover the New England territory.

Meet on Sulphate Turpentine

The Sulphate Turpentine Division of the Pulp Chemicals Assoc. recently held a symposium in New York on sulphate wood turpentine.

Representatives of industry and government were present to discuss the history of the industry, statistics and estimates of future sulphate turpentine capacity, end uses for the product and potentials for increasing its recovery.

G. Fred Hogg of Hercules Powder Co. and Dr. W. David Stallcup of The Glidden Co. explained their companies' treatment of crude sulphate turpentine by refining or converting it into alpha or beta pinenes.

Robert Wier, III, of Hercules explained some of the ways by which the recovery process at pulp mills is being improved to increase the yields of sulphate turpentine in the pulping process.

The Association's figures revealed that the industry's yield is approximately 2.2 gallons of sulphate turpentine per ton of sulphate pulp made from pine wood. Dr. Raymond S. Hatch, vice president of Hudson Pulp & Paper Corp., described a pilot plant operation in which up to four gallons of sulphate turpentine had been recovered per ton of pulp.

It was agreed that an increase to three gallons per ton of pulp would be a satisfactory gain in the recovery of sulphate turpentine.

J. M. Wafer, vice president of West Virginia Pulp & Paper Co., presented a review of the history of the industry.

Terminal Facilities Expanded

Celanese has announced an expansion of chemical terminal facilities at Rock Hill, S. C., to provide storage space and new shipping services for solvents and formaldehyde products.

Tank truck service on formaldehyde and solvents, as well as on acetic acid, will be provided for southeastern district customers, enabling them to maintain minimum inventories.

The terminal is located at the company's Celriver fiber plant in Rock Hill. It is operated by the Celanese chemical division. Formaldehyde facilities are already in operation, while solvent storage facilities are expected to be ready by mid-September.

•

Lead Research Study Set

The Lead Industries Assoc. has contracted for a study of research needs and for a formulation of a research program for the lead industry by the Battelle Memorial Institute.

The study is to provide a guide for future research to be undertaken by the Association. Battelle Memorial Institute is to screen and evaluate possible research approaches and formulate a balanced program based on its findings.

Particular emphasis is to be placed on new industrial uses for lead, its compounds and its alloys, and on developing new lead products. The study is expected to last six months.

NEWS

Gold Rush Town Gets Painted

An all-community Paint-Up Festival was held recently in Weaverville, Calif., for the rejuvenation of the town's historic Main Street. The community is a gold rush town which still possesses many of the old-time buildings and landmarks.

Members of the Weaverville, Calif., Paint-Up Festival Committee check supplies for the paint-up project.

Townspeople painted every building on two blocks of Main Street in order to revive the frontier atmosphere. Many of the town's residents are descendents of pioneer gold seekers.

W. P. Fuller & Co. assisted the Paint-Up Festival Committee with arrangements.

•

Raybo Names Agent

Raybo Chemical Co. has announced the appointment of the Willard N. Swanson Co. as representative in Minneapolis, St. Paul and Duluth, Minnesota.

Willard N. Swanson, founder of the sales firm, was formerly associated with the Worum Chemical Co. of St. Paul.

•

Container Sales Agent Named

Palmer Supplies Co., Times Star Building, Cincinnati 2, Ohio, has been appointed to represent the container division of Jones & Laughlin Steel Corp. in the sales of steel drums and shipping pails.

Report on Steel Containers

Livingston Keplinger, president of the Steel Shipping Container Institute, has reported that while raw materials for the paint, varnish and lacquer industry show price increases of 141 per cent since 1940, steel drums are up 133 per cent and steel pails are up only 122 per cent.

The differences in price rises were attributed to a greater increase in production of steel containers than in raw materials for the paint industry. Steel drum production, cited as an example, is up 115 per cent over 1940, while paint raw materials are up only 83 per cent.

In 1956 the container industry was the nation's second largest user of sheet steel, second only to the automotive industry. More than one million tons of steel were used by the container industry last year.

According to the Steel Shipping Container Institute, the container industry is so closely allied with the basic steel industry, that container manufacturers must pay employees higher wages when steel wages rise.

The industry reached a high in production last year, with a total of 115 million units. The chemical industry accounted for an increase of 83 per cent over 1947-49 consumption levels for heavy drums, and an increase of 137.3 per cent for light drums over the same period.

The use of linings on interior drum surfaces was cited as the important factor in the increasing use of steel drums for shipment of chemical products.

•

Maintenance Report Published

"Techniques of Plant Maintenance & Engineering-1957" is now available from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

The volume is the latest in an annual series of reports on the conference proceedings held in conjunction with the Plant Maintenance and Engineering Show. The book contains 29 papers presented at the conference.

Subject of the papers is the problem of maintenance of plants in many industries. Price of the 273-page volume is ten dollars.

Witco Forms Canadian Firm

Witco Chemical Co. has formed a Canadian chemical firm named Witco Chemical Co., Canada, Ltd., it has been announced by William Wishnick, executive vice president of the parent firm. The Canadian company has been organized to manufacture and sell basic industrial chemicals throughout Canada. Initial sales will be in chemicals for the paint, rubber, plastics and allied industries, according to Mr. Wishnick.

William Wishnick

Mr. Wishnick will head the new firm as president and treasurer. S. M. Freeman has been named executive vice president, and H. B. Seligman has been appointed vice president.

Six acres of land have been acquired in Trafalgar Township, southwest of Toronto, for a plant. Plans call for an office to be located in Toronto.

•

Vinyl Acetate Solutions

Full-scale production of a complete range of vinyl acetate solutions has been announced by Cellofilm Industries, Inc., of Woodridge, N. J.

The firm claims that it is the first to engage in volume production of vinyl acetate solutions in America.

•

Retailers, Researchers Scored

Better trained retail sales people and more original research are the crying needs of the paint industry, according to Dr. J. S. Long, professor of Chemical Engineering at the University of Louisville.

Dr. Long spoke at a joint meeting of the Minneapolis-St. Paul Paint, Varnish and Lacquer Assoc. and the Twin Cities Production Club. He said the industry is not getting the sales volume it should get at the retail level.

Criticizing the time spent by paint chemists in matching products of competitors, Dr. Long said research into truly new products is suffering because of duplication of effort. He proposed that the Federation develop basic formulas for new types of paints and make them available to members.

ASBESTINE 325

64 YEARS of production have paid off for International Talc Co. and its customers. As the world's largest producer of magnesium silicate, International Talc Co. announces the availability of their newest member to the family. . . . Asbestine - 325

THIS NEW PRODUCT FEATURES

Good dispersion with minimum use of oil needed in grinding. . . . enables formulating at higher pigment volume concentrations. Thereby. . . .

REDUCING RAW MATERIAL COSTS

without affecting performance of storage characteristics.

Also available in other grades. . . .featuring these advantages

1. Available in low, medium and high oil absorption
2. Pure white — suitable for white or colored paints
3. Acicular structure affords good suspension
4. Mixes readily in all paint vehicles
5. Contributes to greater durability in exterior paints
6. Excellent flatting agent for flat or semigloss coatings
7. Uniformly low moisture content (less than .5% loss at 212°F.)
8. Bulking value 4.2 gallons per 100 lbs.
9. Packed in 50 lb. paper sacks for your convenience

PRODUCT OF

INTERNATIONAL TALC COMPANY, INC.

WORLD'S LARGEST PRODUCERS OF TALC

ESTABLISHED 1893

90 WEST ST., NEW YORK, N. Y.

INTERNATIONAL TALC CO., INC.
90 West St., New York 6, N. Y.

Please send FREE Sample and Technical Data on ASBESTINE 325.

Name.....
Company.....
Street.....
City.....State.....

SEND COUPON FOR FREE SAMPLE AND TECHNICAL DATA ABOUT

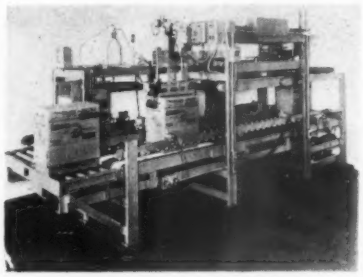
ASBESTINE 325

S. W. Tuttle, Vice-President

NEW MATERIALS & EQUIPMENT

A MONTHLY MARKET SURVEY

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



GENERAL CORRUGATED

AUTOMATIC CARTON MAKER

One Man Operation

New combination one-man automatic carton maker glues and/or tapes bottom flaps before filling as may be specified. Machine may also be used for sealing top-flaps after filling.

"Closed-System" of gluing said to save the usual half-hour make-ready and clean-up time common to exposed glue roll systems. Simple hose clamp allows easy transfer to next gallon of glue. For long shut-downs, easy transfer to a bottle of water cleans out glue, with the water remaining in the system for a trouble-free fresh start by transfer back to bottle container of proper glue.

General Corrugated Machinery Co., Dept. PVP, Palisades Park, N. J.

CHEMICAL INTERMEDIATE

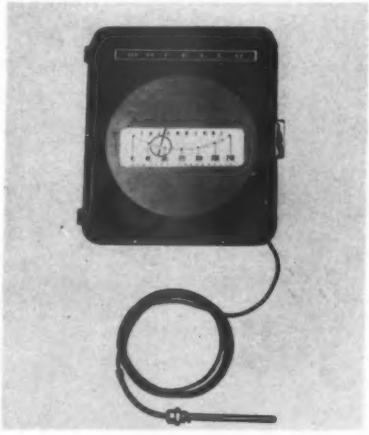
For Alkyd Manufacture

A plasticizer and chemical intermediate, a new form of hydroxypropylglycerine, has been developed by the reaction of glycerine and propylene oxide through a unique process.

A viscous, yellowish-amber liquid, product has an average addition of 2.5 moles of propylene oxide to each mole of glycerine. Said to be less volatile than glycerine, and to have greater permanence on aging, according to tests. Also said to be less hygroscopic than glycerine, affording better dimensional stability.

Called Hyprin GP25, product offers interesting possibilities in the manufacture of alkyd resins and polyesters because of similarity to glycerine. Can be esterified with dibasic acids and anhydrides such as phthalic anhydride to produce products of increased flexibility. May be used to obtain a product with high molecular weight and increased fluidity where a non-drying alkyd, such as a plasticizer, is required.

Samples available from Technical Service and Development, The Dow Chemical Co., Dept. PVP, Midland, Mich.



WHEELCO

THERMOMETER SERIES

For Uniform Accuracy

Recorders, recorder-controllers, indicators and indicator-controllers are included in the Wheelco 4000 series.

Recorders and recorder-controllers use large, easy-to-read charts. Uniform accuracy said to be assured by use of mercury-actuated sensing elements which offer maximum stability over wide ranges of temperatures. Instruments also feature Bourdon coils, friction-free pen arms and Invar metallic compensation for the instrument cases.

Thermotrol temperature indicators and indicator-controllers use plug-in type chassis. Instruments incorporate same construction features as rest of 4000 series.

All instruments are available either as surface or flush mounted units. Wheelco Instruments Division, Barber Colman Co., Dept. PVP, Rockford, Ill.

MOTOR BASE

Belts Easily Adjusted

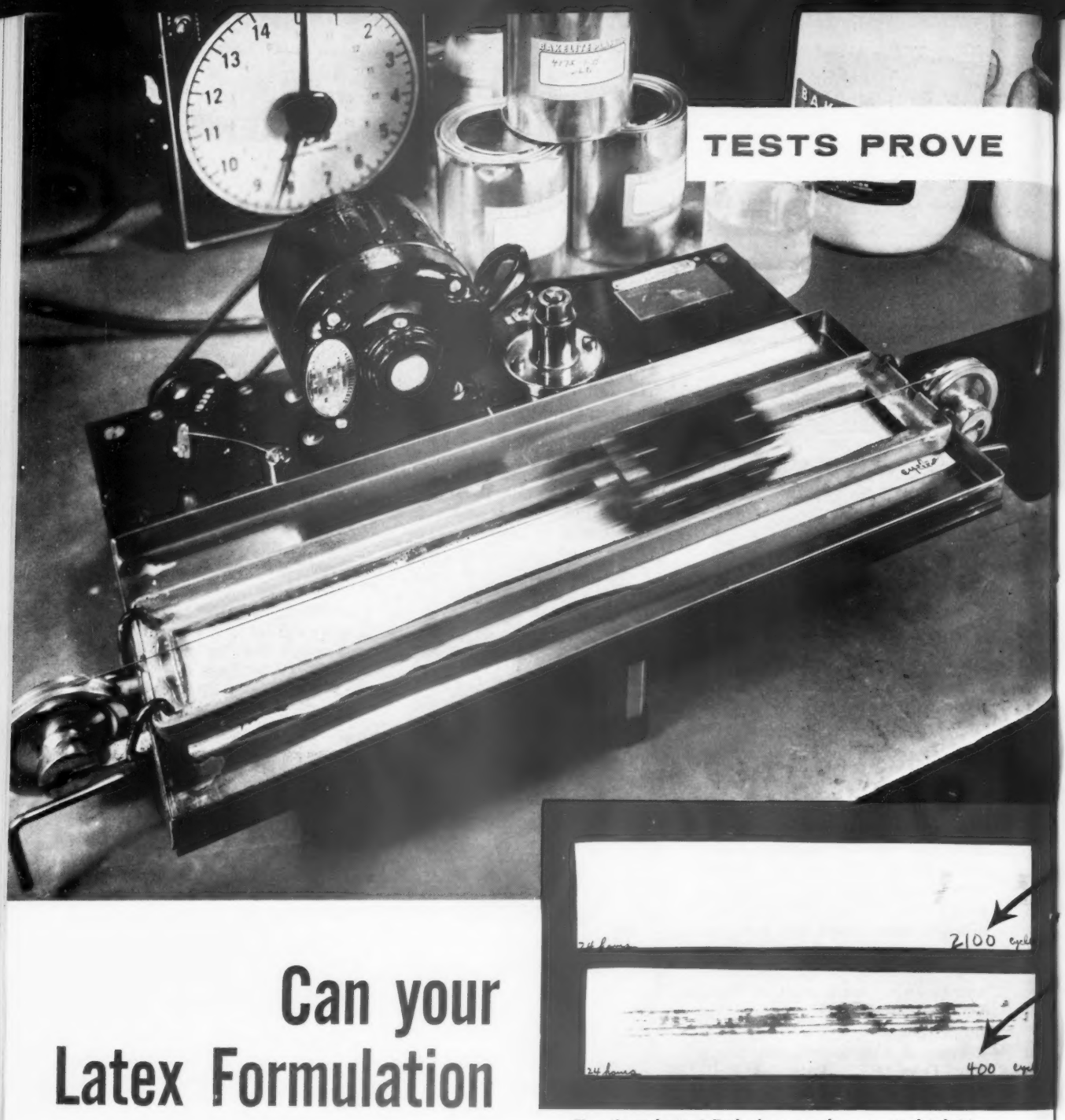
Adjusto-Slide Motor Base said to eliminate most of lost time due to stretched and sagging belts is now available. Belt take-up is accomplished by adjusting only one screw without stopping motor.

Replacement of belts is said to be simple operation. Adjusting screw on most models may be loosened and swung aisde, freeing the top plate and the motor to move far enough to permit removing the old belt and installing new one.

Other features include accurately die-formed top and bottom members which slide freely, yet always maintain perfect belt alignment, and motor base size and mounting hole spacing which accommodate NEMA frame sizes from 182 through 326V in both old and new designations, from one to 30 horsepower.

The American Pulley Co., Dept. PVP, 4200 Wissahickon Ave., Philadelphia 29, Pa.

AMERICAN PULLEY



Can your Latex Formulation pass this test?

Five times better! Both these panels were air dried 24 hours, then placed in the scrub test equipment. Lower paint sample lasted only 400 cycles, while paint sample based on BAKELITE WC-130 lasted 2100 cycles or 5 times better. Think what this means to your formulations!

Early water resistance and filming demonstrated in scrub test begun after 24 hours of drying.

How scrub test was made: A sample of each paint was brushed on pre-primed strips of standard Morest Hiding Power Charts in the same manner. After air drying for 24 hours (at 77 deg. F. and 50 percent relative humidity), the strips were inserted in a Gardner Straight Line Washability Tester. Brush used weighs one pound and works in a ½ per cent soap solution. Note: Gardner machine uses a special rubber gasketed clamp that confines the soap solution to the area of the brush path.

THE QUALITY OF BAKELITE WC-130 LATEX
BRAND

In rugged scrub test, paint based on WC-130 shows 5 to 1 superiority

Heres proof of early water resistance and filming after only 24 hours of drying. WC-130 vinyl acetate latex shows 5 times better performance than the other type of commercial latex paint tested. It means your formulation, using BAKELITE Brand WC-130 Latex, goes into service fast. This is important to customers who paint stores, residences, offices and factories. This advantage gives you extra selling power for extra sales.

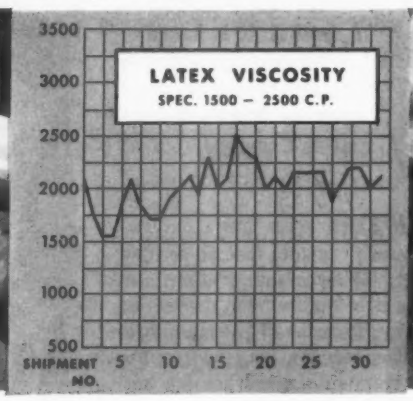
BAKELITE WC-130 Latex offers many other selling advantages. High pigment loading permits excellent hiding power. There is good water resistance . . . proven viscosity stability assures extra shelf life. Tube color acceptance pleases the most discriminating decorators. Tested borate stability gives freedom from roping. Results of laboratory and field tests show the superiority of formulations based on BAKELITE WC-130 Latex.

Make your own test! Test WC-130 latex and prove the difference. For the latest formulating data, see the Bakelite Company technical representative in your area or send the coupon below.

Hiding Power Test: *High* P.V.C. of WC-130 based formulas show better hiding power compared to commercial latex paints tested.

WC-130 Viscosity Test: Reduced scale laboratory chart for 32 tank car shipments shows the consistent high quality of WC-130 Latex. Proof of uniform performance in your formulation!

Borate Stability Test: WC-130 based paint took twice as much borate solution with no agglomeration. Yet, formulation on the right turned lumpy with less than half as much borate!



BAKELITE
BRAND
RESINS FOR COATINGS

UNION CARBIDE

BAKELITE COMPANY
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y.

The terms BAKELITE and UNION CARBIDE, and the Trefoil Symbol are registered trade-marks of UCC.

BAKELITE COMPANY
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y., Dept. YX-153

☐ Please send formulation data *only*.

☐ Please send formulation data and sample of BAKELITE WC-130 for my comparison tests.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

NEW
MATERIALS — EQUIPMENT

LIFT TRUCK CONTROL SYSTEM
For "Walkie" Electric Trucks

Control system for "walkie" electric trucks offers "dynamic braking" and "controlled plugging."

Designated L-S Roto-Cam Control, the system is offered as standard equipment on all Lewis-Shepard high-lift and low-lift "walkies."

"Controlled plugging" enables truck to come to smooth stop and pick up speed in opposite direction when operator reverses control grip. Wear-and-tear on motor is said to be reduced.

LEWIS-SHEPARD

"Dynamic braking" allows truck to come to a slow stop when control handle is released or allowed to return to vertical position. Emergency solenoid brake also included, which prevents operator from being struck by truck.

Lewis-Shepard Products, Inc., Dept. PVP, 125 Walnut St., Watertown 72, Mass.

SILICONE RESIN
For High Temperature Coatings

Silicone resin said to provide greater gloss retention after long exposure to high temperatures than previously possible has been developed.

A typical formulation with product, called 808 Resin, pigmented with titanium dioxide (P/B 60/100) and thinned with xylene, is claimed to retain original 84 per cent gloss rating after 100 hours at 482 degrees F. When subjected to 572 degrees F. for 400 hours, or to 482 degrees F, for more than 2500 hours, gloss rating said to drop only to 70 per cent.

Cured films based on product said to be non-yellowing and to exhibit excellent adhesion, flexibility and resistance to moisture and many common chemicals. Pigment wetting characteristics said to be superior to those of comparable silicone resins.

Developed primarily for use in formulating white and light-colored space-heater and appliance finishes, product is currently available in commercial quantities. Dow Corning Corp., Dept. PVP, Midland, Mich.

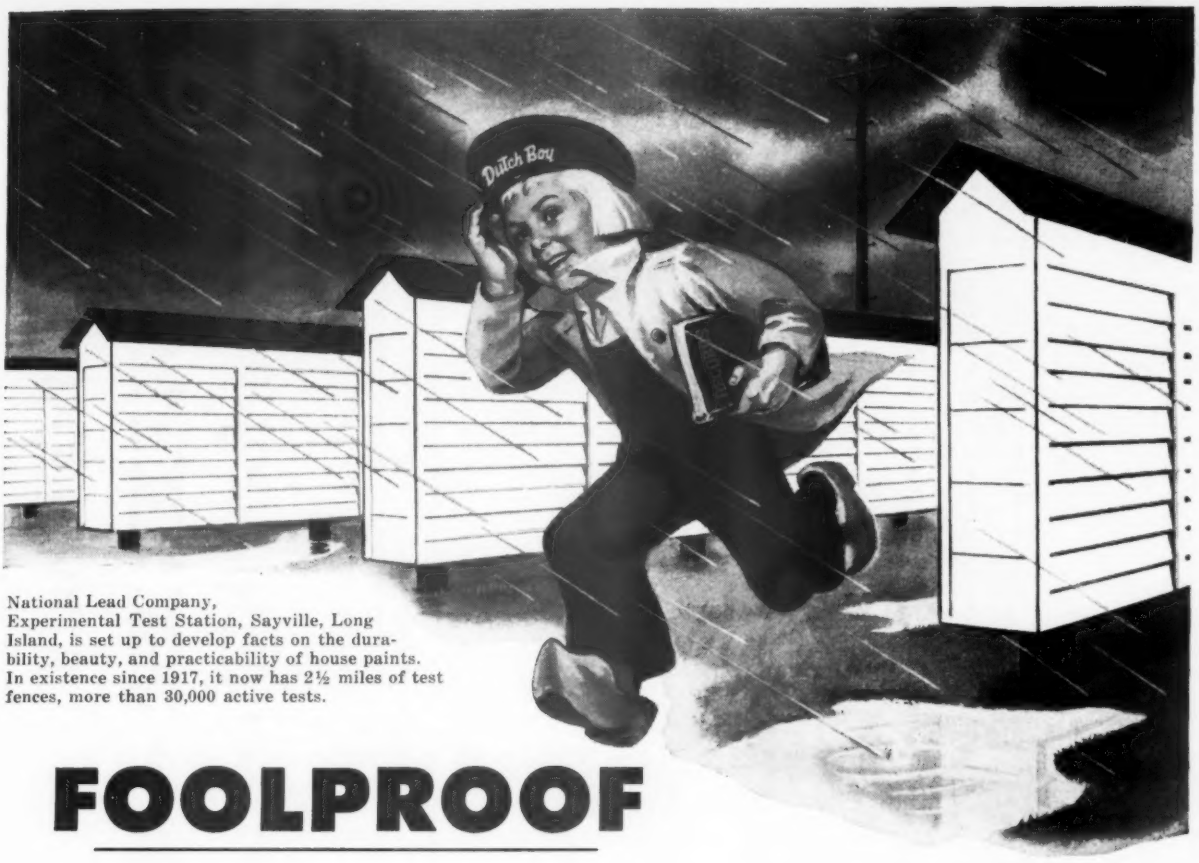
ANTI-FOAMER
For Synthetic Paint Latices

Liquid anti-foamer for use with all major synthetic paint latices has been developed.

Product, called Nopco NDW, said to effectively eliminate foam and insure production of paints with proper density, uniform weight and improved brushing properties. Said to be equally efficient in latex systems of acrylic resin, polyvinyl acetate and styrene-butadiene.

Lasting anti-foaming action permits use of paint shakers for blending colors. Protective Coatings Division, Nopco Chemical Co., Dept. PVP, Harrison, N. J.

NOW!
ALUMINUM LATEX PAINT
... is made possible by a revolutionary new development.
The first aluminum latex emulsion paint has been placed on the market. It is based on a formulation and processing technique developed by Metals Disintegrating Company.
A PROBLEM IN ALUMINUM CHEMISTRY
Because finely divided aluminum pigments lose their identity in the presence of water, no satisfactory aluminum pigmented aqueous system has ever before been developed. Metals Disintegrating Company, founder of the aluminum pigment industry, has now discovered a way to stabilize these pigments opening up a tremendous market for both industrial finishes and trade sales paints.
AN INVITATION TO PAINT MANUFACTURERS
Metals Disintegrating Company does not make paint, but we invite those who do to investigate this dramatic breakthrough in aluminum pigment technology. We will be happy to work with you in realizing its full potential for your product.
MD PRODUCTS
METALS DISINTEGRATING COMPANY, Inc.
GENERAL OFFICES: Dept. F, Elizabeth B, N. J.



National Lead Company, Experimental Test Station, Sayville, Long Island, is set up to develop facts on the durability, beauty, and practicability of house paints. In existence since 1917, it now has 2½ miles of test fences, more than 30,000 active tests.

FOOLPROOF

your exterior paints with Dutch Boy® **"45X"**

(Basic Silicate White Lead)

Chances are you already know that lead gives exterior paints uniform performance. Leading paint makers have agreed on this for years.

But you may not know that Dutch Boy Basic Silicate White Lead "45X" does this with new efficiency, new economy. Thousands of exposure panels at National Lead's Sayville Experimental Test Station prove this.

Take *white* House Paints. "45X", Sayville shows, improves self cleaning yet preserves film integrity.

Take *tinted* House Paints. "45X" helps maintain color uniformity, increases film durability.

Take Primers . . . or Porch and Floor Enamels. When you add Dutch Boy "45X" to your exterior paints, you build up key properties . . . build in *uniform* performance.

Fewer Complaints

Those you hear! Those you don't! Both go down, you'll find. You save time and cost of adjusting complaints. Repeat business comes easier, at less expense.

Cost goes down, too. In each "45X" pigment particle, reactive portion is at the surface . . . making proportionately larger amounts of lead available in each pound.

Fewer complaints! Lower cost! No wonder it pays to put Dutch Boy Basic Silicate White Lead "45X" in your exterior paints.

NATIONAL LEAD COMPANY, 111 Broadway, New York 6, N. Y.
In Canada: **CANADIAN TITANIUM PIGMENTS, LIMITED,** 630 Dorchester Street, West • Montreal

With Oronite ISOPHTHALIC

LOWER-COST RESINS

that *outperform* higher- cost resins

Baking resins! With Isophthalic it's now possible to formulate superior baking finishes at lower cost. Isophthalic based resins provide harder finishes with better gloss retention that are more resistant to alkali, water and mineral spirits. Because of greater thermal stability of Isophthalic resins you can maintain higher-temperature baking schedules—less time for products in baking oven.

Air-dry industrial resins! Faster dry-times are obtained from Isophthalic based resins. For example, at 25% oil length a "set-time" of less than 5 minutes and a "through-dry time" of one hour can be obtained. Other qualities include superior original gloss retention with no yellowing effects and better adhesion to metal surfaces.

Alkyd flat resins! Oronite Isophthalic alkyd flats exhibit exceptionally good viscosity let-down curves. High solids resins are easily manufactured, and when formulated in paints at low solids content, have desirable working viscosities. Viscosities are obtained without jell structure to reduce cooking problems. Other advantages: fast dry, low odor, excellent hold-out and scrub resistance, low-cost and better compatibility with odorless thinners.

Interior gloss enamel resins! Isophthalic based resins permit production of lower-cost gloss enamels. They allow use of more zinc oxide to reduce yellowing with no loss in initial gloss. A remarkable improvement in flexibility is also obtained.

Exterior house paint resins! Qualities exhibited by house paints based on Isophthalic include: uniform through-dry with no paint wrinkling, faster drying, practically no yellowing in light tints, outstanding flexibility characteristics, better color retention, mildew resistance—and can be manufactured at lower-cost.

Isophthalic offers you a new approach to surface coatings with lower raw materials cost and superior performing products—opportunities for marketing new and better products—new sales volume and expansion into new fields.

ORONITE CHEMICAL COMPANY

EXECUTIVE OFFICES
200 Bush Street, San Francisco 20, California

SALES OFFICES
New York, Wilmington, Chicago, Cincinnati,
Houston, Los Angeles, San Francisco

EUROPEAN OFFICE
36, Avenue William-Favre, Geneva, Switzerland

ORONITE CHEMICAL COMPANY
200 Bush Street • San Francisco 20, California
Please have an Oronite representative contact me regarding how I should use Isophthalic to gain lower cost resins with superior performance.

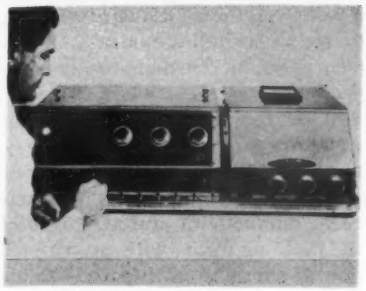
NAME_____

ADDRESS_____

FIRM_____

4281

NEW MATERIALS — EQUIPMENT



GARDNER

COLOR-DIFFERENCE METER
Automatic Standardization

Model AC-2 Gardner Automatic Color-Difference Meter contains high-sensitivity head and automatic built-in standardization features.

Equipment intended to fulfill laboratory and production requirements where speed, accuracy, dependability and ease of operation are criteria of instrument performance.

Basic exposure head houses a lamp with four lenses and mirrors which divide the beam four ways, directing each section upon the sample at a 45 degree angle of incidence. Said to illuminate the sample from four directions to give average readings over entire exposed specimen area.

Claimed to afford precision color measurements of wrinkle finishes and other non-uniform surfaces. Gardner Laboratory, Inc., Dept. PVP, P.O. Box 5728, Bethesda 14, Md.

CORROSION INHIBITOR
For Use in Metal Treating

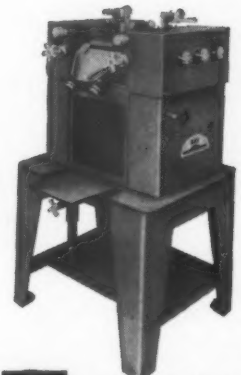
Corrosion inhibitor for use in sulfuric, sulfamic and phosphoric acids has been developed for metal treating operations such as descaling and pickling baths.

Called Inhibitor 2508, product is an aliphatic derivative which can be used where acids are employed to chemically remove undesirable coatings from metal surfaces. Product is in liquid form, readily dispersible in water and said to be highly effective in low concentrations. May be used at rates as low as 100 to 500 ppm.

Laboratory tests said to indicate that mild steel in 15 per cent sul-

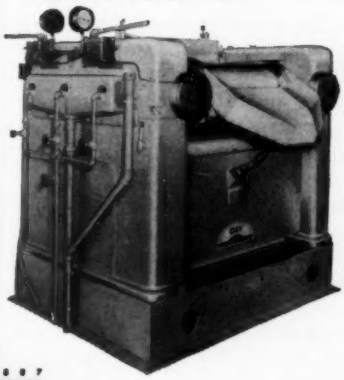
DAY 5 x 12 MILL
allows you to make more profit on short orders.
Features include:
- Rugged heavy duty construction
- Feed hoppers
- Day Hydra-Set as optional equipment

increase your profits three ways



DAY 4 x 8 LAB MILL
saves time because you get the answers quickly and accurately.
Features include:
- Either fixed or floating roll operation
- Quick release hand-wheel adjustments
- Floor or bench model

DAY PRODUCTION MILL
saves time and money by virtually eliminating "downtime", because of precision engineered, rugged construction.
- Available in 10 x 22 and 14 x 30 sizes
- All standard production mills are readily converted to either fixed or floating roll operation
- Day Hydra-Set available as optional equipment



in mixing equipment DAY *means longer life span*

THE J. H. DAY COMPANY
Division of Cleveland Automatic Machine Company
4922 BEECH ST., CINCINNATI 12, OHIO

Quality equipment for baking, paint and varnish, printing ink, chemical, rubber, pharmaceutical, cosmetics, paper and pulp, explosives, food, ceramics, candy, soap, sugar and milk products.

Mexico: T. de la Pena e Hijos, S.A., Nazas 45-A, Mexico 5—D.F.

furic acid at 200 degrees F. has corrosion rate of more than 2.5 pounds per square foot per day, compared to less than 0.03 pounds per square foot per day in inhibited acid.

Armour and Co., Chemical Division, Dept. PVP, 1355 W. 31st St., Chicago 9, Ill.

GRAY

FLUID TRANSFER PUMP
Starts and Stops Automatically

Lightweight (13½ pounds) fluid transfer pump automatically starts and stops as operator squeezes or releases trigger on high volume, gasoline-type valve.

"Direct-From-Drum" pump said to be spark-free. Fluid remains "sealed-in" from original 55 gallon drum to point of use, eliminating contamination and extra handling. Firm says pump cannot burn out.

Pump operates either in open head or two-inch bung opening of original drum, and is said to empty a full-size drum faster than the liquid can be poured from the bung. May be used for transferring fluids from drums to smaller containers or for mixing or measuring operation.

Gray Co., Inc., Dept. PVP, 1099 Sibley St. N. E., Minneapolis 13, Minn.

SYNTHETIC PEARL ESSENCE
In Concentrated Form

Nacromer YNC, a synthetic said to produce a lustre equal to or greater than natural pearl essence has been introduced.

Product comes in concentrated paste form, and is said to mix easily with most coating materials. Can be applied by spray, brush or dip to wood, metal, plastic, glass, leather, paper and other materials. May also be incorporated into plastics before molding.

Addition of transparent pigments or dyes permits wide range of lustrous effects. Product now being used to obtain gunmetal, gold and silver finishes. The Mearl Corp., Dept. PVP, 124 E. 40th St., New York 16, N. Y.

PLASTISOL FORMULATIONS
Contain Vinyl Resins

Two plastisol formulations have been developed containing Pliovic AO, a vinyl dispersion resin, and Pliovic S70, a medium viscosity resin.

Formulations are expected to find extensive use in rotational molding, following a current trend to replace slush molding. Use of a relatively small amount of plasticizer in formulations said to furnish excellent hardness in finished products.

Wide range of color, gloss and hardness properties said to be obtained by varying formulations slightly. Superior flow characteristics claimed for initial stages of the molding cycle, with exceptional fluidity maintained up to 120 degrees F.

Chemical Division, Goodyear Tire and Rubber Co., Dept. PVP, Akron 16, Ohio.

FROM HERCULES NEW PLANT, PE *is on its way in ever-increasing volume for resins for paints, varnishes, lacquers, adhesives, printing inks, floor coverings . . . for plasticizers, synthetic drying oils . . . as an ingredient in fire-retardant paints . . . and for a growing list of other important uses.*

FLAME TEST UNIT
Measures Flame Spread

Apparatus for measurement of of rapidity and severity of flame propagation permits thorough investigation of burning characteristics of all types of materials.

Test assesses quantitatively variables which contribute to the spreading of fire along the surface of building materials. Test is especially useful because of its speed. Can be run with relatively small samples.

Method employs a radiant heat source in front of which a six by 18-inch sample of test material is mounted. Ignition is forced near the top and flame progresses downward. Flame Spread Index is calculated from rate of progress of flame front, together with a factor involving the rate of heat generation.

United States Testing Co., Dept. PVP, 1415 Park Ave., Hoboken, N. J.

LABORATORY RELAY
Transistorized

Laboratory relay claimed to be the first transistorized equipment of its kind is now on the market. Guaranteed for one million contacts with any non-inductive load of four amperes or less.

May be used to control bath or oven temperatures, maintain liquid levels, with a monitoring photocell, to trip an electric counter. Advantages include sensitivity to 12 microamperes input, no warm-up, can't overheat, versatility, compactness, ruggedness, safety and convenience.

Fisher Scientific Co., Dept. PVP, 384 Fisher Building, Pittsburgh 19, Pa.

BATTERY-POWERED TRACTOR
For Pushing and Pulling

A compact, battery-powered tractor for use in both pulling and pushing operations in confined areas is now on the market.

The machine has a normal draw bar pull of 200 pounds, and a breakaway rating of 700 pounds. Tractor has two speeds in both forward and reverse, and travels at two mph fully loaded and 3.2 mph empty.

A 12-volt system powers high torque series wound motor. Available in two models, 39¼ inches long and 44-5/8 inches long, less coupler. Overall width of both models is 32 inches. Weight, without battery, is 1150 pounds.

Powerworker Division, Clark Equipment Co., Dept. PVP, Battle Creek, Mich.

PLATFORM TRUCK
Transports up to 4000 Pounds

"Freighter" platform truck is designed to transport loads of up to 4000 pounds safely through confined aisles and crowded terminal and warehouse areas.

Truck powered by Wisconsin's air-cooled Model AEN engine with fully automatic drive. Engine provides 8.1 horsepower at 3000 r.p.m. for ample power to negotiate ramps up to 10 per cent with full load.

Truck operates at 10 m.p.h. Steering ratios of 1:1 or 3:1 are offered. Electric starting system, engine hour meter and padded operator support included as standard equipment.

"Tugster" industrial tractor with drawbar pull of 750 pounds and same specifications as "Freighter" platform truck also available from Hyster Co., Dept. PVP, 2902 N.E. Clackamas St., Portland 8, Ore.

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NEW MATERIALS — EQUIPMENT

HYDRAULIC HAND LIFT TRUCK
In Popular Price Class

Hydraulic hand lift truck in "popular price class" requires only six strokes of handle to lift 2500-pound load full lifting height of three inches.

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Barrett-Cravens Co., Dept. PVP, 628 Dundee Road, Northbrook, Ill.

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Product Development Dept., Colton Chemical Co., A Division of Air Reduction Co., Inc., Dept. PVP, 1747 Chester Ave., Cleveland, Ohio.

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Constructed of heavy-duty steel tube. Hydraulic jack is actuated by foot-operated pedal. Lifting weight capacity is 750 pounds. Mounted on four-inch oil, gas and spark proof ball-bearing casters. Floor-lock holds unit in place, and drum lock holds drum in pouring position.

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Gum is water-white and practically odorless, with melting range of 59-80 degrees C. Will dissolve in cold water in all proportions to give non-viscous, neutral clear solutions. Also soluble in methyl and ethyl alcohols, ethyl acetate, methylethylketone, chloroform, methylene chloride and hot glycerin. Insoluble in aromatic and non-polar solvents.

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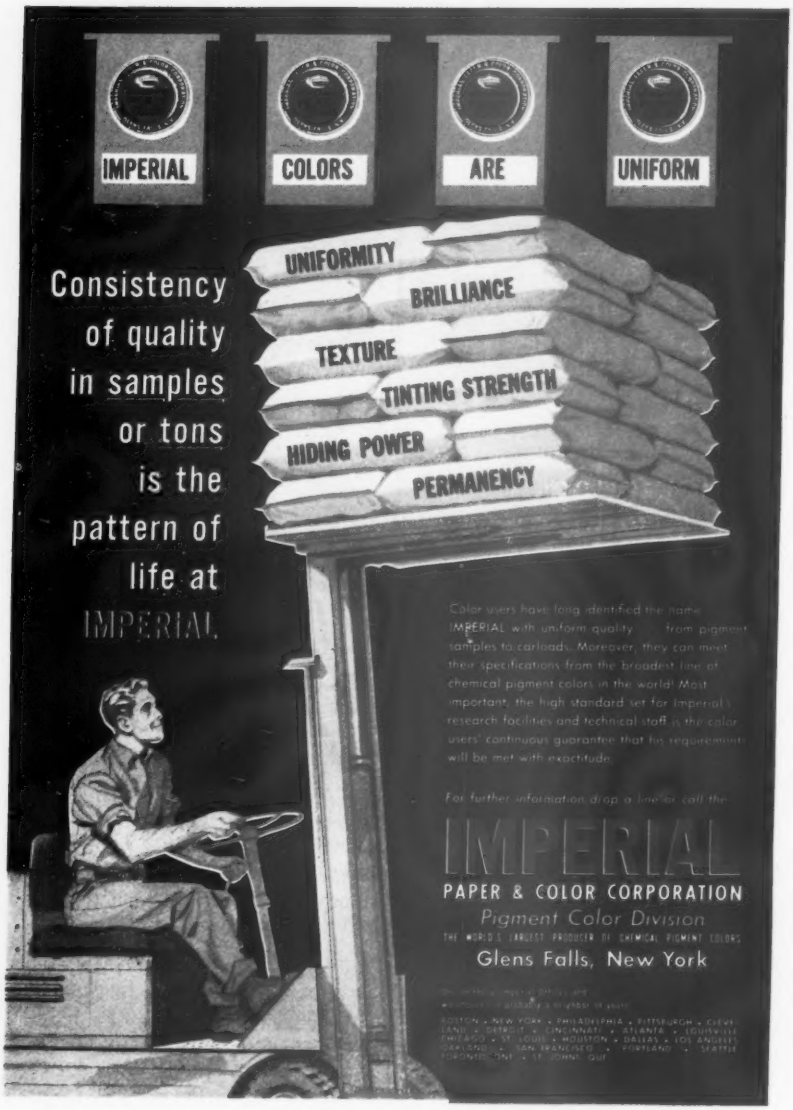
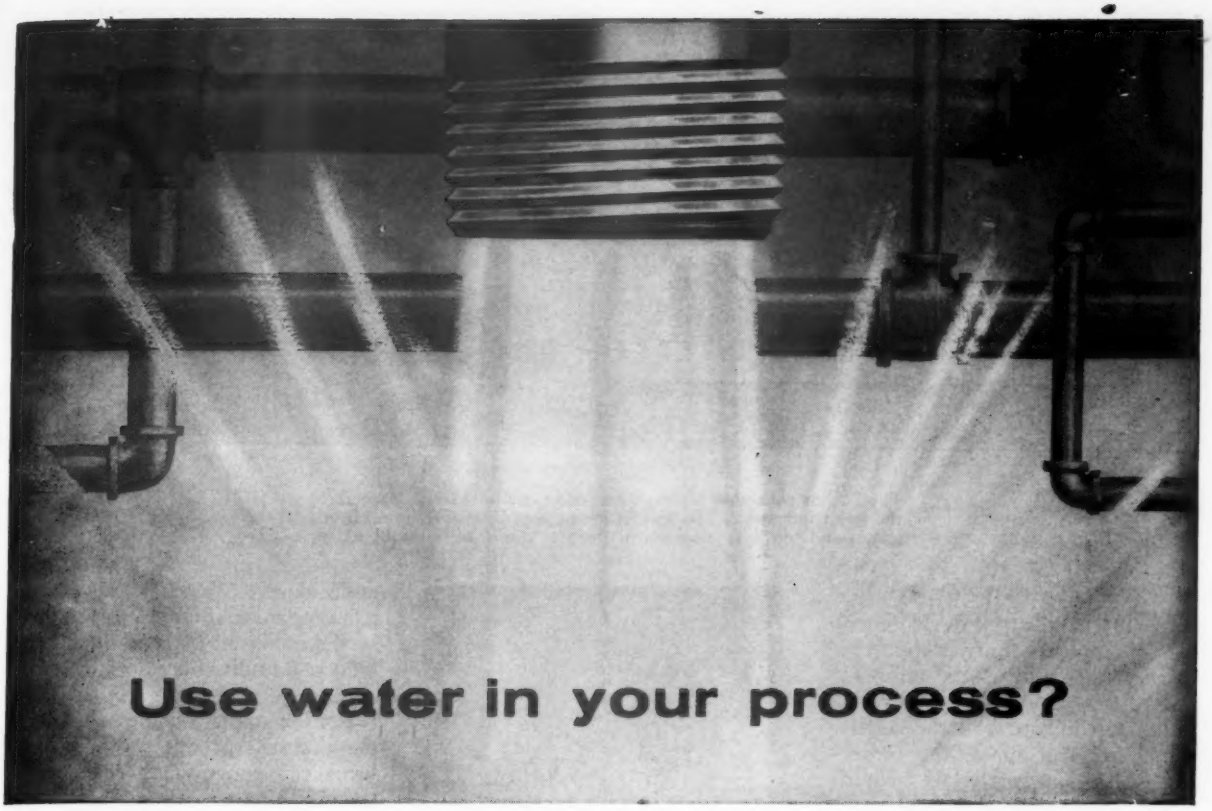
Glyco Products Co., Inc., Dept. PVP, Empire State Building, New York 1, N. Y.





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TERGITOL nonionics are particularly good for emulsifying greasy soils, oils, and waxes—and holding them in stable suspension. TERGITOL nonionics offer you a wide range of solubilities—from complete oil solubility to complete water solubility even at elevated temperatures. TERGITOL anionics are designed to give you fast wetting and penetrating action under difficult conditions.

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CHEMICALS

Union Carbide Chemicals Company
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y.

TERGITOL Nonionics	Cloud Point °C	Properties
NP-14	—	Oil-soluble emulsifier and detergent.
NP-27	20	Aromatic-soluble emulsifier and wetting agent.
NPX Anhydrous	56-60	General purpose detergent, wetting agent, and emulsifier.
NP-35	90-95	Detergent and wetting agent at elevated temperatures or in presence of dissolved salts.
NP-40	100	Detergent and wetting agent above 100° C.
TMN	35-37	Outstanding nonionic wetting agent with good leveling rewetting properties.
XD	60-65	Outstanding emulsifiers and low-foaming detergents.
XH	90-100	

TERGITOL Anionics	Conditions for Use
7 and P-28	for dilute solutions of acids, alkalies, and salts.
4	for moderately concentrated solutions of acids, alkalies, and salts.
08 and EH	for concentrated solutions of acids, alkalies, and salts.

You'll want a copy of the new 40-page booklet covering the properties and uses of TERGITOL surface-active agents. Ask for F-5900. Address Union Carbide Chemicals Company, 30 East 42nd Street, Department H, New York 17, N.Y. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.

The author continues his random reflections on various aspects of the paint industry. The opinions expressed in this column are his alone and do not necessarily reflect those of this publication.

Pests Outwit Poison

AS THE industrial development of tropical countries continues to accelerate and as the temperature of the "temperate" zones continues to climb toward the heights of the tropical zones, the protection of organic materials such as cloth, wood, insulation, and paint from the ravages of fungi and bacteria becomes increasingly important. Paint technologists formerly in comparative blissful ignorance of the problems posed by insect pests and disease organisms now feel the need to "bone-up" on pathology.

The first and most discouraging fact we learn is that insects and disease producers have an amazingly strong "will to survive" which is matched by fantastic powers of adaptability. Thus, instead of being stamped out completely by repeated treatment with specific poisons and medicinals, these tenacious enemies of man manage to modify themselves in such a way that they can eventually resist even the most promising treatments. Paint technologists now recognize that the well-known reduced effectiveness of DDT and penicillin is our concern as well as that of physicians, pathologists, parisitologists, entomologists, and others devoted to the elimination and control of human enemies.

Therefore, an article by Professor David Gottlieb of the Department of Plant Pathology, University of Illinois, should also be of interest to us. It appeared in

Phil Heiberger

the February 1957 issue of Phytopathology under the title, "The Effect of Metabolites on Antimicrobial Agents."

This article is essentially a well documented review covering the effects of a wide variety of toxicants on various bacteria and fungi. Professor Gottlieb found that the effectiveness of many poisons was reduced or even neutralized by compounds metabolized by the very microorganisms we wish to destroy. In studying this situation, he showed that the metabolic products could be classified into a number of types of detoxication. In doing this, he hoped that some of these ideas would suggest other views on the problem of the resistance of certain microorganisms to various toxic agents.

Since many of the toxicants discussed are finding use in paint formulations and since many of the microorganisms cited are related to those causing paint failures, the facts and findings are both interesting and pertinent to all of us.

For example, many types of metabolites (products of metabolism) can function to reduce the toxicity of chemical agents. Some of these diminish the inhibitory effects of poisons (an inhibitor is an agent that tends to check organic activity) because they form complexes with toxic inorganic ions; others remove a toxic ion from solution by direct chemical bindings. Some organisms can supply an excess of an essential component of a metabolic system for which the fungicide has been a competitive antagonist. Enzymes hydrolyze or in other ways change the toxic compound. Metabolites might even increase the toxicity of a chemical by providing orientation centers for concentrating the toxicant on the cell membrane. Changing the pH of a solution could change the ability of an agent to penetrate the cell membrane by transforming it from an ionized to a nonionized state.

A careful reading of the original article should engender a better understanding of these mechanisms and start your ideas rolling. Let's explore these concepts briefly.

Chemical Combination

CHEMICAL reactions between metabolites and poisons have frequently been reported which produce new compounds with little or no activity. Various agents

such as mercury, copper, arsenic, bismuth, silver, penicillin, streptomycin, and others are detoxicated by the amino acid cysteine. The very active sulfhydryl group of the cysteine molecule provides the detoxifying property. Therefore those poisons that react with the sulfhydryl group in the microorganism can also react with cysteine. When cysteine is free, it competes for the toxic material and binds it into a physiologically innocuous compound.

Complex Formation, Chelation

THE TOXICITY of a metallic cation can be destroyed by the formation of a complex or chelate between an amino acid and the toxic heavy metal. Some of the most common fungicides contain copper in various forms. Often these are applied as insoluble compounds, such as cuprous oxide, copper carbonate, or the copper salt of fatty acids. Most of their toxicity, however, is due to the formation of the copper ion. Amino acids such as glycine and alanine will react with cupric ions to form a stable non-toxic complex. Casein hydrolysate and sodium citrate are also known to inactivate toxic agents by chelation.

Competitive Antagonism

ANOTHER mechanism by which metabolic substances can nullify the action of a poison is "competitive antagonism." A chemical compound that is structurally similar to a coenzyme, substrate, or other essential component of an enzyme system can attach itself to positions in or on the cell that a metabolite normally occupies and thereby prevent the normal cell functions. Some organic fungicides or bactericides might play this role for as yet unknown essential metabolites. For example, pyridine-3-sulfonic acid is an effective bactericide because of its structural relationship with essential nicotinic acid.

Hydrogen Ion Concentration

ORGANISMS can produce substances that change the pH of a medium. Some of these, such as citric, lactic, and oxalic acids, lower the pH; others, such as ammonia or organic amines, raise it. In addition, differential sorption of inorganic ions brings on similar transformations in the acidity of a medium. Basic compounds tend to have their ionization suppressed in basic solution, and acid compounds are similarly affected in acid solutions. Often it is only the nonionized form of an organic molecule that passes through the cell membrane. Hydrogen ion concentration also determines germicidal effects by influencing the solubility of compounds, as shown with copper naphthenate. More marked effects on such compounds as cuprous oxide are expected because even small amounts of acid could cause large solubility changes.

Oxidation Reduction Effects

IN A FEW cases, reversal due to oxidation-reduction have been clearly established. The reduced activity of streptomycin in the presence of ascorbic acid has been attributed to oxidation-reduction. Highly oxidized compounds, such as anthroquinones and napthoquinones are known to protect streptococci from iodinin.

Proximity Effects

IN THESE instances, it is the locus on or in the cell at which the inhibitory agent is to act that is altered. If the forces at the locus are oriented for attracting the fungicide, then its resultant activity is increased; if they are not so disposed, the converse occurs. Such reactions can account for the effect of fatty acids with 10 to 16 carbons. The activity of streptomycin is enhanced by these fatty acids, whereas that of penicillin is weakened. With cetyldimethylbenzylammonium chloride, there is an unexpected decrease in activity, but in this case the fatty acid combines with the quaternary before it has been adsorbed on the cell.

A theory for these phenomena is that the fatty acids are bound to the lipids of the cell by van der Waal bonds. This increases the concentration of negative groups near the loci of antibacterial activity, thereby exerting a stronger attraction for basic materials. Basic inhibitors, such as streptomycin and 9-aminoacridine, are attracted in greater concentration; negatively charged materials, such as penicillin, tend to be repulsed from such charged centers. Neutral materials, naturally, are unaffected.

Lecithin Effects

LECITHIN is composed of fatty acid esters of glycerol in which the glycerol is linked also to phosphorylated choline. It is produced by bacteria and fungi as well as by many other plants and animals. Since it is a detergent, its protective activity is surprising, because surface active compounds usually increase bactericidal activity. Yet lecithin protects dermatophytic fungi against the fungicidal activity of propamidine. One clue to the reversal of propamidine toxicity is the resemblance of lecithin to quaternary ammonium compounds; both are cationic because of the quaternary ammonium ion. Since lecithin nitrogen has a positive charge, it competes with propamidine for the anionic position on the bacterial cell. Lecithin, which is not toxic, thus prevents the more toxic base propamidine from being adsorbed on the cell surface.

Similar protective effects of lecithin for fungi are reported when hexylresorcinol is used to inhibit growth.

Displacement Effects

ANOTHER mechanism of detoxication is the displacement of a toxic agent by a relatively innocuous compound, such as the reaction of atabrine or of quinine in the presence of long chain polyamines. Apparently, the more basic polyamines displace the toxic material, atabrine, from the negatively charged position on the cell.

An evaluation of the evidence presented in this paper leaves no doubt about the ability of diverse metabolic products to influence the antimicrobial activity of various chemical agents used to control disease or pests. Much more needs to be learned. Professor Gottlieb's paper with its 57 references should provide an excellent starting place for those interested in this field.

It seems fairly clear that these annoying paint preservative problems will continue to plague the industry until pathologists and paint technologists learn more about each other's trades and then join hands in battle.

PERSONNEL CHANGES

THE GLIDDEN CO.

William L. Ellslager has joined the research and development staff as a technical assistant, it has been announced by Dr. William von Fischer, coordinator of research and development.

Mr. Ellslager had formerly been a senior research associate and a special lecturer at Case Institute of Technology. He has also been associated with the Grasselli Chemical Division of du Pont, the United States Government laboratories and the chemicals division of the Glenn L. Martin Co.

CONGRESS PAINT

Milton Kaplan has become technical director of the firm, it has been announced. He was previously technical director of Central Paint and Varnish Works.

NAPKO

Otto J. Mileti, Jr., has joined the firm as technical director, it has been announced by E. D. Konken, president.

Mr. Mileti was formerly laboratory supervisor of the Schaefer Varnish Co. in Louisville, Ky. He is a past vice president of the Louisville Paint and Varnish Production Club.

He holds a B.S. in Chemical Engineering from the University of Notre Dame, and a master's degree from the University of Louisville.

AMERICAN MINERAL SPIRITS

William A. Oudshoorn has become manager of the recently opened Ohio sales office in Columbus, it has been announced by Karl F. Giloth, vice president and Midwestern sales manager.

W. A. Oudshoorn

Mr. Oudshoorn has had more than 15 years of experience with the firm. He rose to his present position through the general office, city sales department and various sales assignments.

He attended Oregon State College.

UNION CARBIDE CHEMICALS

J. B. Harlow has been appointed central division manager, it has been announced.

Mr. Harlow joined the company as a technical representative in 1941, after receiving a B.A. in Chemistry from Harvard University. He has previously been district manager in Albany, Atlanta and Detroit.

G. E. Kuehn, Julian Paul and **D. F. Swartz** have been reassigned as district managers, it has also been announced.

Mr. Kuehn has been transferred from Buffalo to Detroit, Mr. Paul has moved from Boston, where he was assistant district manager, to Baltimore, where he will be manager, and Mr. Swartz transferred from Baltimore to Buffalo.

Five technical representatives have also been reassigned, it has been announced.

The new assignments are: **A. A. Douglas,** Albany; **R. R. Failla,** Buffalo; **H. R. Hubbs,** Charlotte; **C. D. Schmidt,** Newark, and **R. J. Spath,** Chicago.

DIAMOND ALKALI

Dr. John H. Wotiz has been named group leader in the firm's exploratory research department at Painesville, Ohio, according to an announcement by Thornton F. Holder, director of research.

Dr. Wotiz had been associate professor of Organic Chemistry at the University of Pittsburgh since 1954. He will now supervise research relating to acetylene chemistry.

He takes over the responsibilities of **Dr. Alfred Hirsch,** who will now devote full-time effort to planning long-range research programs for the company.

Dr. Wotiz holds a B.S. in Chemistry from Furman University, an M.S. from the University of Richmond, and a Ph.D. from Ohio State University. He is a member of the American Chemical Society.

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MILTON ROY CO.

G. J. Wilson has been appointed general manager of the firm's new Florida plant, it has been announced. Mr. Wilson was formerly assistant to the firm's president, Robert T. Sheen.

He is a graduate mechanical engineer from Stevens Institute of Technology, and has also completed the management course of the American Management Assoc. Before joining the firm he worked on power rectifier substations for General Electric.

G. J. Wilson

J. A. Mitchell

John A. Mitchell, Jr., has been named to succeed Mr. Wilson as assistant to the president, it has also been announced. He has been order service manager for the past two years, and was an application engineer prior to that.

Mr. Mitchell is a graduate of Cornell University with a degree in Mechanical Engineering. He was formerly a sales engineer with Worthington Corp.

George W. Schneider is the new manager of research and development of the analytical instrument division, and **Milton R. Sheen** has become manager of manufacturing for the new Florida plant, it has also been announced.

AIR REDUCTION

Dr. Shadburn Marshall has been named director of metallurgical research at the firm's central research laboratories, Murray Hill, N. J., according to an announcement by G. V. Slottman, vice president of research and development.

Dr. Marshall has specialized in materials application and process development for the fabrication of metals. Much of his work has been with nuclear materials and fuel elements.

He is a member of the American Society for Metals and the American Institute of Mining, Metallurgical and Petroleum Engineers.

GELVATEX COATINGS

Al Shell and **Charlie Giles** have been appointed to the firm's sales force, according to an announcement by Don Gendron, assistant general manager.

Mr. Shell was formerly sales manager of the southern division of the Security Lithograph Co. He is a specialist in the color field.

Mr. Giles is a graduate of the University of Minnesota. He joined the firm after an association with Western States Lacquer.

DOW CHEMICAL

Paul M. Jensen has been advanced to a new position with the plastics sales staff at the firm's Midland, Mich., headquarters. He has been with the company for 24 years and was supervisor of plastics sales in the Detroit office prior to his promotion.

Mr. Jensen attended Michigan State University. He will handle special sales assignments in connection with molding materials.

John E. Donalds succeeds Mr. Jensen as plastics sales supervisor in the Detroit office. He has been with the firm since 1950.

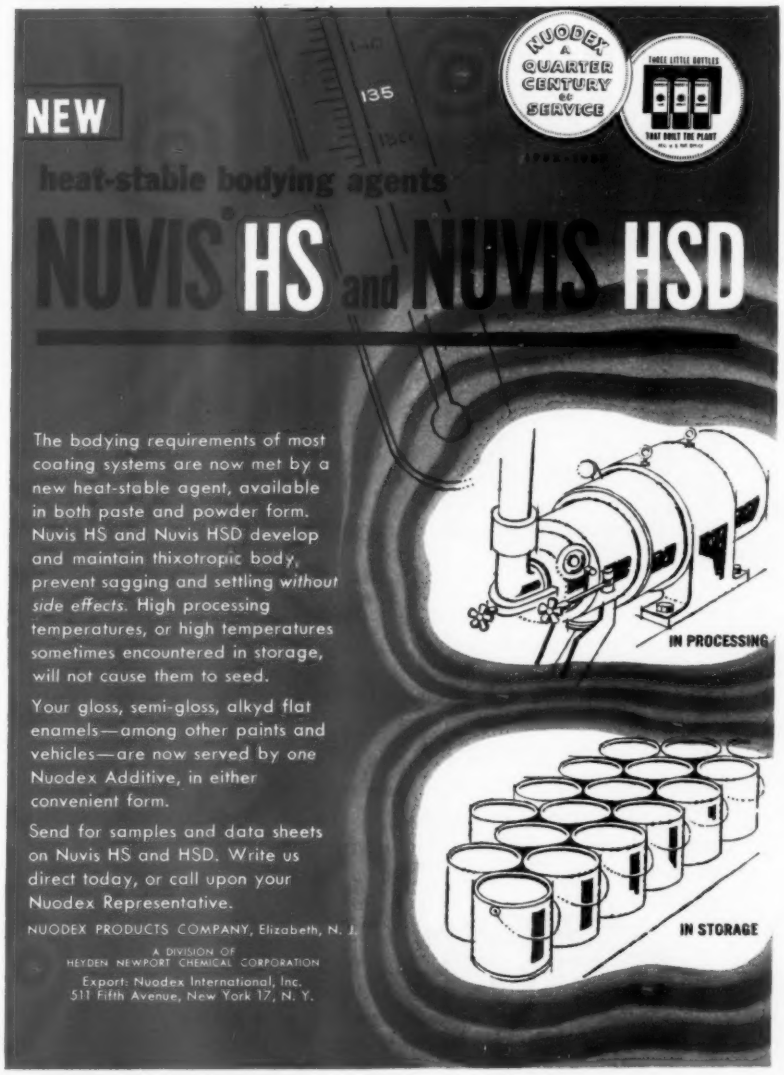
Mr. Donalds holds a degree in Chemical Engineering from the University of Minnesota, and a master's degree in Business Administration from the Harvard Business School.

WITCO

Walter J. Tanner has been appointed to the eastern regional sales force of the firm's organic chemicals division, it has been announced.

Mr. Tanner has been with the company for seven years, and has most recently been technical service manager for pigment blacks. He has also handled carbon black technical service in the New York area.

He attended Pratt Institute and Columbia University, and is a member of the New York and Philadelphia Printing Ink Production Clubs and the Paint, Plastics and Printing Ink Division of the American Chemical Society.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CROWN CORK & SEAL

Edward P. Stuart has been promoted to division manager of sales of the can division, it has been announced by John L. Carnie, general manager of the division.

E. P. Stuart

Mr. Stuart has been in manufacturing and sales activities for the past 25 years.

Robert J. Siebert has been appointed sales manager of the newly created eastern area. He will be responsible for the entire area and will coordinate can division sales activities along the Eastern Seaboard. He had previously been area manager of the northeast region.

Fred Pinkerton, former assistant district sales manager of can division sales in Orlando, has been promoted to sales manager of the Orlando district.

John C. McEver has been named sales representative in northern and central Florida, with headquarters in Orlando.

CIBA

Charles M. Spofford and **Walter W. Wilson** have been elected to the firm's Board of Directors, it has been announced by Dr. Robert Kaeppeli, chairman of the Board.

Mr. Spofford is a member of the law firm of Davis, Polk, Wardwell, Sunderland & Kiendl of New York City. He is also a director of Guaranty Trust Co. of New York and the Mutual Life Insurance Co. of New York City. He was appointed U. S. deputy representative to the North Atlantic Council in 1950, and he also served as chairman of the North Atlantic Council Deputies.

He attended Northwestern University, the University of Grenoble in France and Yale University, where he received an A.B. in 1924. He graduated from Harvard Law School in 1928.

Mr. Wilson is a partner in the investment firm of Morgan Stanley & Co. of New York City. He had previously been associated with Continental Illinois National Bank & Trust Co. of Chicago.

He received a B.S. from the University of Pennsylvania in 1925, and an M.B.A. from The Harvard University Graduate School of Business Administration in 1927.

SOUTHERN LACQUER

W. Vernon Barrett has been elected president of the firm, it has been announced. He has been an executive with the company since its organization in 1950.

W. V. Barrett

Mr. Barrett replaces O.D. Belanger, who resigned to devote his time to other interests. Mr. Barrett will supervise production and technical operations in addition to his other duties. He was formerly associated with India Paint & Lacquer Co., and the Ditzler Division of Pittsburgh Plate Glass Co.

Roger Cresswell is the newly elected vice president of the firm. He will also function as general manager. He was previously associated with Interchemical Corp. and the Arco Company of California.

Ben E. Avey, formerly of General Paint Corp., has become sales manager.

INTERNATIONAL TALC

Frank H. Smart has been named director of technical sales, according to S. W. Tuttle, vice president of the firm.

F. H. Smart

Mr. Smart's primary responsibilities will be to act as a liaison between Mr. Tuttle and the company's sales force. He will also supervise the firm's agents and field staff in the United States and Canada.

He was administrative assistant to the director of sales of the Harchem Division, Wallace & Tiernan, Inc., prior to his present association. He has also spent many years in the minerals field with Whittaker, Clark & Daniels, Inc., and in the plastics field with du Pont.

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Chemical Sales Division

UNION BAG-CAMP PAPER CORPORATION

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COLUMBIAN CARBON

W. Raymond Ahrberg has joined the firm's Akron office as technical salesman for the carbon black and pigment division, it has been announced.

W. R. Ahrberg

Mr. Ahrberg comes to the firm after four years as technical service representative in the Toledo office of the Barrett Division of Allied Chemical & Dye Corp. He was previously with the DeVilbiss Co.

He is a graduate of the University of Toledo, and holds a B.S. in Chemistry.

Mr. Ahrberg replaces **William E. Ford,** who has been transferred to technical service. Mr. Ford has taken over from **Alden H. Davis,** who is to become resident technical service manager in Sao Paolo, Brazil, for Companhia Petroquimica Brasileira-Copebras.

AMERICAN MINERAL SPIRITS

Peter C. Thompson has become a sales representative for the Midwest with headquarters at the firm's newly opened Columbus, Ohio, office, it has been announced by Karl F. Giloth, vice president and Midwestern sales manager.

Mr. Thompson joined the firm in 1956, after graduation from the University of Wisconsin with a degree in Chemistry. He has completed a training program at the company's control laboratory at Carteret, N. J.

DU PONT

Richard C. Cecil and **Robert B. Micklewright** have been assigned to the Pittsburgh and Houston districts respectively as sales representatives, it has been announced. Both districts have been newly created.

The following sales representatives have also been appointed in other districts:

Edward W. Smith, Philadelphia; **Robert L. Harbour,** Detroit; **Thomas J. Coonan,** San Francisco.

CATALIN CORP.

John Ziccarelli has joined the firm's New York office, **Herman Pickles, Jr.,** has been assigned to the Chicago office, and **E. B. Lee** has been appointed to the Houston office, it has been announced.

Glenn Nebel will handle chemical sales in the Los Angeles office, it has also been announced.

GOODYEAR

Robert S. Savage and **Joseph R. Kelly, Jr.,** have become special representatives of the firm's chemical division, it has been announced by C. O. McNeer, general sales manager of the division.

Mr. Savage has been assigned to the Boston district office and will cover the New England area, providing service for the firm's products in the rubber, plastics and coatings departments.

He has been with the company since 1950, and has done four years of research. He holds a degree in Chemical Engineering from Syracuse University and a master's degree in Business Administration from Harvard University.

Mr. Kelly has been assigned to the Cleveland office. He joined the company in June after five years of previous experience in the rubber industry. He is a graduate of Antioch College and holds a B.S. in Chemistry.

NATIONAL LEAD

Roy Dahlstrom has been appointed director of research of the firm, it has been announced. He will supervise and coordinate the activities of all the firm's laboratories.

Dr. Dahlstrom received a Ph.D. from the University of Chicago in 1930, where he held a National Lead fellowship. He became chief chemist at the Sayreville, N. J., plant of the titanium division in 1935. He was appointed director of research for the division in 1945 and technical director in 1948.

Charles L. Schmidt has been named technical director of the titanium division, it has also been announced.

Mr. Schmidt has been assistant technical director of the division since 1953. He graduated from the University of Illinois, and joined the firm in 1929.

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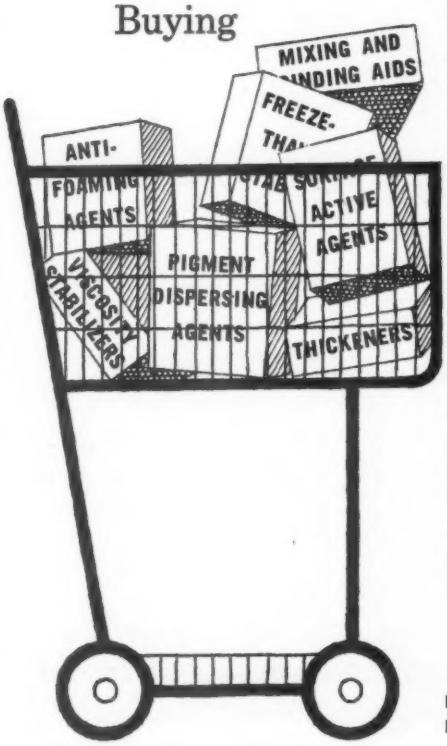

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PATTERSON

Glenford M. Shibley has been named manager of territorial sales, it has been announced. He was previously assistant to the director of sales since joining the firm in January of this year.

G. M. Shibley

Mr. Shibley will be responsible for supervision, administration and training of the firm's sales organization in 19 cities. He is a graduate of Ohio State University, and he attended Wayne University and Detroit College of Law.

THE REARDON CO.

Ray M. McCabe has been appointed sales representative in northern California and Utah, according to an announcement by Harold F. Volgstadt, vice president.

Mr. McCabe spent 13 years in sales in the San Francisco area prior to his appointment. He is an alumnus of San Francisco City College, where he majored in business administration.

COLTON CHEMICAL

Morris A. Kimmel has been named New England sales representative, it has been announced by E. J. Hill, sales manager.

Mr. Kimmel will be headquartered in Boston. He is a Chemical Engineering graduate of M.I.T., and has been sales representative for American Resinous Chemicals Corp., American Polymer Corp. and the Borden Co. chemical division for the past 16 years.

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SPENCER KELLOGG

Fred J. Blacker has retired after completing 40 years of service with the firm, it has been announced by Howard Kellogg, president.

F. J. Blacker

Mr. Blacker had been secretary of the firm since 1950. He had previously been manager of the import-export department, a position he retained after his promotion to secretary.

He joined the firm in 1917 in the administrative offices in Buffalo as a junior clerk in the accounting department.

ARCHER-DANIELS-MIDLAND

T. G. Garfield, Jr., has been promoted to assistant sales manager for linseed oil, it has been announced. He was formerly regional sales manager at Milwaukee.

Mr. Garfield joined the firm in 1949 as a market analyst. He was transferred to Milwaukee as a sales representative in 1950. He is a graduate of Iowa State College, and received a master's degree in Marketing from the University of Iowa.

Mr. Garfield is a past president of the Milwaukee Paint, Varnish and Lacquer Assoc.

Stanley Shepard, formerly technical sales representative in Milwaukee, succeeds Mr. Garfield as regional sales manager there, it has also been announced.

Mr. Shepard is a graduate of Yale University. He joined the firm in 1955.

STERN CAN

Harvey Weiss and **Stuart S. Stern** have been named to the firm's Board of Directors, it has been announced by Harold S. Stern, president of the firm.

Mr. Weiss is secretary of the company. He is a graduate of the University of Illinois, and holds a master's degree from the University of Connecticut. He has been with the firm since 1953.

Mr. Stern is a vice president of the firm and has also been appointed assistant to the general manager. He is a graduate of Tufts College.

UNION CARBIDE CHEMICALS

D. H. Merry has been transferred to the St. Louis district sales office, **T. L. Proctor** to the Detroit district sales office, **R. G. Short** to the Cincinnati district sales office, **E. A. Vierengel** to the New York district sales office and **A. H. Welle** to the Boston district sales office, it has been announced.

abstracts

Adherence of Amphipathic Molecules to Metallic Surfaces

by R. B. Waterhouse and J. H. Schulman: Paper presented at Autumn Congress of British Oil and Color Chemists Assoc.

The paper provides a study of the structure and the adherence of paint films, constituted by simple amphipathic molecules on the surfaces of copper, aluminium and iron. The study was conducted by the measurement of the contact angle, of the coefficient of friction and by measurements of the electron diffraction.

The results of the study served to show that the presence of a film of a long chain polar compound, generally termed an amphipathic compound or surface-acting, at the surface of a metal can modify profoundly the chemical and mechanical behaviour of this metal.

A film of this kind, whose thickness often does not exceed that of a molecule can have the following effects. It can render the surface chemically inert, improve its resistance to corrosion and can similarly reduce the quantity of material eliminated by mechanical abrasion, when this surface glides on an analagous surface. The effectiveness of such a film depends on the nature of the adherence of the terminal polar group to the metal and of the lateral adherence between the hydrocarbon chains. The first is a phenomenon of a chemical nature while the second is defined by the configuration of the molecule and the topology of the surface.

It has been established that one can distinguish three principal types of primary absorption.

1. The physical absorption of the amphipathic molecules, dissociated and non-dissociated, which is produced in the absence of metallic ions. The absorption on platinum or on other non-reactive metals or on metals less noble of high pH is characteristic of this type of absorption which is non-selective and reversible;

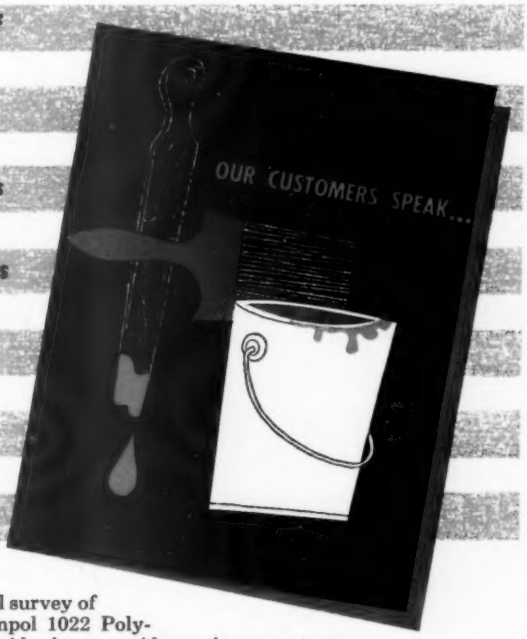
2. The chemisorption of the dissociated amphipathic molecules in the presence of base metal ions. In this phenomenon it is necessary to include the absorption of anionic detersive agents such as for example, the alkylsulfates of sodium and of fatty acids on the reactive metals such as copper or aluminium, under neutral or acid conditions. The phenomenon is selective and slowly reversible.

3. The formation of a precipitate or insoluble flocculate which adheres to the surface of the metal by a mechanism which is not yet explained. This type of adsorption results from the interaction of the metallic ions and of the dissociated amphipathic molecules. The phenomenon is selective and slowly reversible, but differs from the chemisorption by the fact that the mechanical adherence of the film to the matal surface is considerably more feeble.

These two last types of primary absorption present a high selectivity, both regarding the nature of the polar groups in the absorbing molecule and the nature of the metallic ions at the solid surface.

The authors describe a certain number of tests which have led to results capable of being discussed. It was confirmed that the effectiveness of these

Survey of Users of Empol® 1022 Polymerized Acids Testifies to Benefits Imparted to Wide Variety of Formulations



A recent personal survey of customers of Empol 1022 Polymerized Fatty Acids shows a wide use in many types of industrial and trade surface coatings. Among these are short, medium and long oil length varnishes and drying, semi-dry, and baking alkyds.

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absorbed films and their action on the behaviour of metallic surfaces can depend entirely on the mechanical modifications to which they are subjected.

For example, when the disturbance is small, resulting among other things from the presence of an air bubble, the hydrophobic film constituted by an absorbed precipitate, can still present a sufficient adherence to the metal surface. When it is desired by the presence of this film, to permit the gliding of metallic faces one on the other, a greater adherence to the surface of the metal is necessary. For example, in the case of a lubricating problem, the chemi-sorbed film is only capable of giving the desired result. It is probable similarly that the nature of the film necessary to ensure the adherence of the two surfaces, as for example a coating of paint on metal, should be chemical.

The Structure of Paint Films

by S. H. Bell: Paper presented at Autumn Congress of British Oil and Color Chemists Assoc.

This paper commences by an examination of the principal facts which have been established today concerning the structure of paint films. Facts associated with this are questions such as the chemistry and physio-chemistry of the oils, of the resins, of the varnishes and oxidation, polymerization and destruction of these products.

On the pigment side, the role of these products results from direct action, from the chemical nature, which they can exercise on the formation of the paint film. Also of their action of a mechanical or physical nature resulting from the size, from the shape and which intervenes for example, with the absorption of water by the paint film, its permeability, its surface brilliancy and its texture, its destruction, etc.

In researches of this nature, it appears more and more clearly that the films of oil, varnish and paint, are not static mediums. Certainly it is easy to observe already, important changes during the course of time, manifesting themselves with the drying of the films, their hardening, their aging, their alteration. More subtle modifications however, and sometimes very important ones, can be produced in the interior of the film. Such modifications, of a chemical or physical nature, require more profound researches in the interior of the film, together with the chemical or physical measurements which are proceeded with in a normal paint examination.

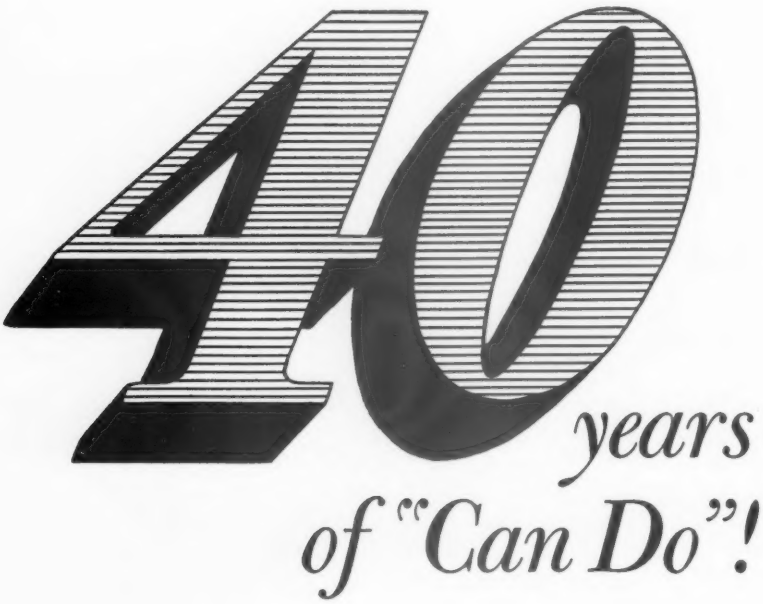
The paper contains the essentials of our knowledge on the physical and chemical aspects of the structure of paint films constituted by various products and of which the drying is produced either by oxidation or else by polymerization. Information concerning those which are subjected to a direct polymerization during the course of the drying, either by stoving or by the addition of a catalyst can be found in the researches conducted on the polymerization and condensation of the synthetic resins. The mediums which dry simply by loss of solvent in the majority of cases, have been studied less deeply as regards what concerns in particular, their behaviour and aging.

In the particular case of the emulsion type paints, the products based on the synthetic resins have a particular interest.

Certain aspects of the structure of emulsion paint films based on polyvinyl acetate, can be easily studied by electronic micrography. For example, these micrographs reveal that in certain cases, particles of non-plasticized resins have separated and are of uniform dimensions in a film formed by the drying of the emulsion. In other cases and if a sufficient quantity of plasticizer is added, the particles of resin swell, become more mobile and a film is formed constituted by a more or less continuous matrice.

However, in the numerous micrographs which have been made of these films, pigmented or not, it has been rare to confirm the existence of a complete film continuity. As regards the pigments, their dispersion varies enormously. In certain cases, there is observed the existence of important aggregates of pigment particles; in other cases, these particles are more or less regularly dispersed.

The structure of the internal part of a paint film can be examined by pro-



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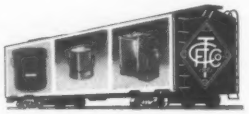

ceeding to take photo-micrographs of the sectional cuts of this film. There is then confirmed how largely the state of dispersion of the pigment can vary in the interior of a fragment of the film. It is definite that the electronic micrography of paint films based on synthetic resin latex will provide a method of investigation of paints of great technical interest.

Finally, the author dealt similarly with the physical and chemical effects of aging under the action of atmospheric agents. Certain electron microscopic photographs were shown of paint surfaces after aging.

The Linear Visco-Elastic Behaviour of Paint Films

by N. A. Brunt: Paper presented at Autumn Congress of British Oil and Color Chemists Assoc.

This paper had the object of describing a certain number of researches conducted to resolve the problem of the rational and scientific examination of paint films and coatings based on organic products.

During the course of these researches, two varnishes, one constituted of pure, cooked linseed oil and the other constituted of the same oil cooked with colophony were examined in a detailed fashion by spectroscopy. In particular, there was examined the elastic behaviour of these products as a function of the time, by the examination of their spectra, making use of two different techniques. It was thus possible to establish a relationship between the dimensions and the relative frequency of the aggregates of molecules participating in the Brownian movement. From the confirmations made, one has been able to draw the conclusion that the cooking of the oil with the colophony causes the formation of aggregates of greater dimensions.

The author estimates that if the elastic spectrum of the products constituting a paint and the modifications resulting from radiation and the action of water can be known, it would be possible to deduce from this conclusion on the duration of practical service of the paint.

This hypothesis has in addition, been verified in the case of the two varnishes examined, and in the case of four other paints it has been possible to confirm this. It has been possible in particular, to verify that the action of the resin on the resistance to aging of the oil and which is manifested by a diminution of this resistance, can be entirely attributed to the fact that the presence of this product renders the film of cooked oil more sensitive to the action of water.

After having dealt with the theoretical aspects of the question and described the experimental method which was utilized, the author drew a certain number of conclusions from the findings which are as follows:

1. All the paints and all the varnishes examined by the method of mechanical spectroscopy follow the Boltzman superposition principle. Their mechanical behaviour is linear up to an elongation of at least 20%. This signifies that the filming medium of the paint is amorphous and that no crystallization is produced when the product is elongated;

2. The alkyd resins and the varnishes constituted of linseed oil and of standoil do not show the phenomenon of viscous flow. After cooking with colophony, they show this phenomenon immediately after drying but it disappears in three weeks;

3. The study of the mechanical spectra of these varnishes and paints shows that these substances belong to the category of bodies which, from the thermorheological point of view can be considered as simple. This property simplifies considerably the task of determining the complete spectra. It suffices to measure a part of the spectra at different temperatures.

4. For all the products which were made the object of the examination, it was confirmed that the ultimate properties: tensile strength and elongation to rupture are less characteristic and depend much less on the composition and the pretreatments to which the products are submitted, than the mechanical properties measured for small deformations;

5. The mechanical spectroscopy should furnish information on the dimensions and mobility of the molecu-

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lar aggregates which participate in the Brownian movement. The information thus obtained should be of great use for the study of the influence of the cooking of the oils and of their mixture with the resins;

6. In proceeding to a very extended investigation of the properties of a paint film: Visco-elastic behaviour, ultimate mechanical properties, as well as the study of the effects of aging, of radiation, of the action of water, it should be possible to be able to predict the practical qualities of the paint and in particular, the preservation of its brilliancy and its resistance to cracking.

Some Physical Characteristics Of Films of Epoxy Resins

by T. F. Bradley: Paper presented at Autumn Congress of British Oil and Color Chemists Assoc.

In this communication, the author studied from the physical viewpcint, the superiority of the varnishes based on pure phenolic resins or on alkyd resins with the varnishes based on the natural resins. He gave the hypothesis that this superiority is probably due to the physical qualities of tensile strength and of tenacity, higher for the synthetic resins than for the natural resins. Also equally to the fact that the synthetic resins can be modified from the view point of their chemical structure which permits of reducing the quantities previously necessary of drying oils.

The appearance of the epoxy resins constitutes the progress of this evolution, in the sense that the employment of these resins permits of reducing still more the quantity of drying oil employed. In certain cases even, it is possible to suppress these oils totally. This permits of improving considerably the mechanical strength of the films and their chemical resistance.

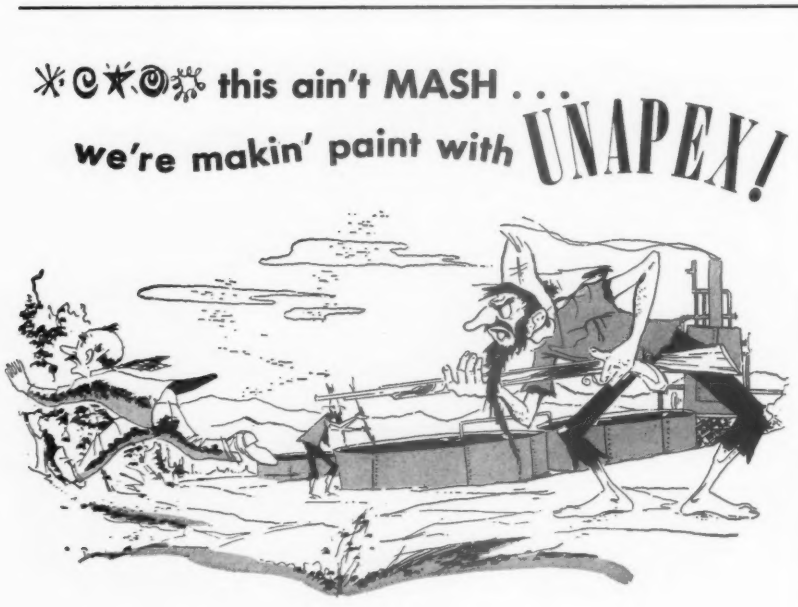
The epoxy resins, of which the condensation is effected by the employment of amines, when utilized in the form of films or of moulded parts, have tensile and flexion strengths which largely exceed those of resins and plastics based on non-oriented products. The volume change which is produced during the course of the condensation is extremely reduced and these resins, the same as plastics based on aromatic products, possess smaller coefficients of thermal expansion than films or moulded plastics based on drying oils, on cellulose compounds or on aliphatic products.

The epoxy resins of which the condensation has been made by the employment of amines, preserve their exceptional mechanical qualities between −40° and +25°C. It is only from about 40° C. onwards that they commence to soften and an increase of their elongation is registered at the expense of their tensile strength. This transition phase is not however analagous to the softening that is confirmed in the case of thermoplastic materials. This is because this phenomenon, being produced on a product which has transversal bonds, is not accompanied by liquifaction or of solubilization. The measurements of hardness and of photoelasticity confirm the findings made by the examination of the deformation curves as a function of the load.

The work which is still in progress shows that in addition, one can modify the structure of these resins by increasing the aromatic or cyclic groups and by increasing the functionality. It is hoped thus to modify to an appreciable extent the softening point of the resins and their critical temperature.

The adherence, in the practical sense of the term, depends on a considerable number of factors; in particular, the mechanical qualities of the film, its cohesion, the wetting of the base support, the variations of volume under the influence of temperature or during the course of the condensation, the resistance to water and to chemical products and consequently, to numerous factors which intervene, side by side with the pure adhesion forces.

The ultra-centrifugation method of Malloy, Soller and Roberts, seems to constitute the best method available to measure the pure adhesion. Recourse has also been made to other procedures which permit, in particular, of establishing a relation between the reinforcing action of a pigment on a filming product and the adhesion of this latter on a surface having a chemical constitution analagous to that of the pigment. It has also been attempted to establish a relationship between the wetting heats of a support by a filming product, and the adhesion between this support and the filming product.



Perhaps this is over-simplification—but there is no doubt—it is easier and more economical to manufacture Butadiene-Styrene or Acrylic paints when UNAPEX is used as the emulsion vehicle.

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The interest of the epoxy resins as adhesives, as protective coatings and as plastic materials, depends not only on a single characteristic, but on a suitable equilibrium between different properties.

Evaporation of Binary and Ternary Mixtures of Solvents

by P. D. Wright: Paper presented at Autumn Congress of British Oil and Color Chemists Assoc.

The object of this study was to determine the changes of composition which are produced in the evaporation of binary or ternary mixtures of solvents and of thinners up to an evaporation of 80 to 90% of the liquids. It was hoped to establish an indication of the compositon of volatile substances remaining in a film, when this has attained the "dust-dry" condition, when a mixture of solvents of known composition has been employed.

The tests were conducted in an environment permitting of regulating at will the humidity and all the studies were conducted at a temperature of 25° C. and with a relative humidity of 65%. These test conditions correspond largely to those which exist in a spray gun installation.

Tests were conducted on binary mixtures constituted of an active ester or a ketone as solvent and by a hydrocarbon as thinner. In the case of ternary mixtures, the tests were carried out on those not containing two active solvents of average boiling point: normal butyl acetate and methylisobutyl ketone, these mixture having it seems, a dominant role in the drying of a cellulose varnish. The test conditions have sometimes been different from those which exist in practice. However, when the evaporation is sufficiently prolonged, the results obtained can be utilized.

The tests undertaken under these conditions have not confirmed the statements that it was impossible to predict the evaporation speed. The variations of composition of the mixture of solvents which are produced can be deduced from the indications which one possesses on the speeds of evaporation, of the solvents taken individually. When one compares, for example, the evaporation of binary mixtures without any addition, and that of the same mixtures to which one has added a non-volatile body as for example dibutyl phthalate, no important difference is confirmed when toluol is employed as the diluant. On the contrary, when the commercial product termed S.B.P. 3 is used as the diluant, it is observed that the low boiling point solvents seem to be retained by the non-volatile product, as for example dibutyl phthalate. Unfortunately, the advantage that could be obtained from the presence of this diluant is balanced out by the reduction which it causes on the solvent power of the mixture.

The binary mixtures were prepared with the addition of alcohol and it was observed that ethyl alcohol or isopropyl alcohol are eliminated at almost the same speed, without these products being retained by the ester or by the ketone.

In the work conducted on the evaporation of films of cellulose varnish or of resin varnishes, the tests were conducted in an atmosphere of which the temperature and the hygrometric condition could be controlled, also without it being necessary to withdraw the test samples from the chamber to weigh them. Operations were conducted with a mixture containing butyl acetate or methylisobutyl ketone. As the resin, there was utilized colophony modified by maleic acid (Lewisol 33), a gum ester (Ester gum 8 L) or nitrocellulose.

It appeared that no important difference exists between the speed of evaporation, either of the pure mixture of solvents, or else of the mixture containing a resin, at the point when 80% of the solvents have been evaporated. This confirmation allows it to be assumed that the changes of composition which are produced during the evaporation of the pure mixtures of solvents and which were studied at the beginning of the paper, are comparable to those which are produced when one proceeds to the evaporation of a solution of resin or of cellulose compounds in the same mixture of solvents.

With the exception of the mixtures of pure solvents, all the solvents tried showed after 4-5 hours of evaporation, i.e. when there still remained 6% of

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volatile substances in the film, speeds of evaporation which tended towards a constant value. A prolonged drying does not permit of obtaining the complete elimination of the volatile constituents.

There appeared to be appreciable differences of affinity for the solvents in certain cases. Thus, the solutions containing a gumester retain a greater proportion of the mixture based on butyl acetate, while colophony treated by maleic acid tends to retain the mixture based on methylisobutyl ketone.

Protective Coatings in Chemical Factories

by P. I. Kolesnikova and N. V. Korzin: Khim. Prom. September 1955, No. 6, 25-30 (345-350).

Tests were conducted over a series of years, in factories manufacturing sulfuric acid, chlorine, nitrogen manures, superphosphate both with paint coatings which were applied directly on to the equipment, and also with test pieces of steel arranged at different parts of the factories.

The first coating was formed of glycero-phthalic, perchlorvinylic, copolymers of vinyl chloride and vinylidene chloride varnishes, as well as of mixtures of perchlorvinylic varnishes containing an inert filling material. The following coatings ensuring the chemical and atmospheric resistance were constituted by paints formulated by varnishes of perchlorvinylic resins etc. The different combinations of these components and the number of coatings applied, permitted of protecting apparatus which was operating under the most varied conditions.

The results obtained provide the possibility of an effective protection for two years or more but also show the necessity of a suitable preparatory treatment of the surfaces before their coating by the protective paints and of a constant maintenance of the surfaces in operation.

Isopropyl Alcohol in the Varnish Industry

by P. Macinelli: Ind. Vernice (Italy), Vol. 9, No. 10, pp. 261-263.

Isopropyl alcohol is obtained by the thermal cracking of petrol. The different phases of the production can be schematised as follows: thermal cracking, fractionation of the mixture of olefines, propylene, catalytic hydrogenation, isopropyl alcohol, rectification, azeotropic mixture at 31% by vol., rectification, anhydrous isopropyl alcohol.

The isopropyl alcohol is a volatile liquid, characterized by an odor which is more penetrating and less agreeable than that of ethyl alcohol. The toxicity threshold is two times less than that of ethyl alcohol. The solvent power of the isopropyl alcohol is notable for acetyl cellulose, various oils, the alkalcids, gums and various natural and artificial resins. This alcochol is miscible in all proportions with the usual solvents of cellulose. Finally, its other characteristics (speed of evaporation, surface tension, viscosity, quotient of dilution) serve to make it a product which is appreciated in the manufacture of paints, varnishes etc.

The Desmophene-Desmodur (Isocyanate) Varnishes

by R. Hebermehl: Chimie des Peintures, Vol. 18, No. 12, pp. 441-449.

The Desmophene-Desmodur procedure is based on the aptitude of the isocyanates to react on alcohols and forming urethanes, this being a simple addition reaction without the formation of secondary products. The Desmodurs are di- or tri-isocyanates which are mixed at the moment of employment with Desmophene, which are polyalcohols more or less esterized by dicarbonic acids.

Accroding to the different base materials, one can thus obtain a range of products giving more or less hard coatings. These varnishes which are air drying, possess properties which are analagous to varnishes which are stoved. These properties are excellent resistance to abrasion, to solvents, to water, to heat (according to their composition).

The principal field of employment of these varnishes is the wood finishing industry, particularly as varnishes for coating parquet floors. They can similarly be employed without inconvenience in the food industry.

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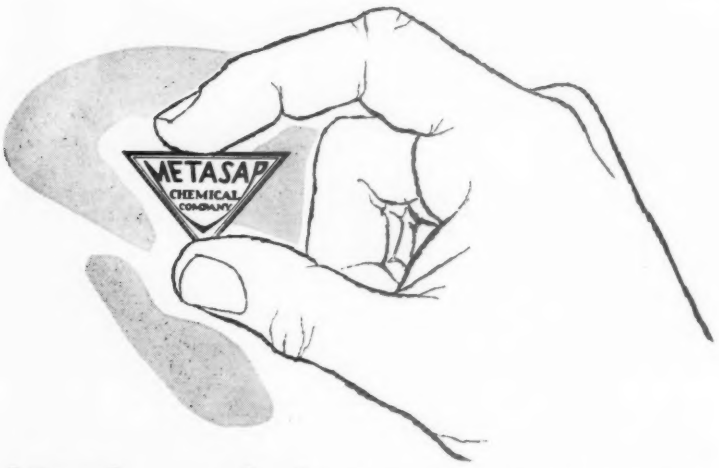

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Metasap Stearates are produced *always* with your requirements uppermost. A research staff second to none – a modern plant equipped to make "the cleanest stearates made" are your assurance of predictably excellent performance in your plant. And Metasap Stearates are sold by men who are intimately familiar with your processes—you can rely on their advice and help.

Chances are you are using Metasap Stearates already. If not, it's profitable to do so.

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NEWS

J. B. Durra & Co. Formed

J. B. Durra & Co. has been organized to specialize in marketing and financial services for the plastics industry. The firm is headquartered at 77 W. Washington St., Chicago 2, Ill.

Services of the firm are aimed at small to medium size companies, and to large companies needing additional aid for existing development departments. Services are in the fields of market research and development, product development, financing and brokerage for the acquisition or sale of plastics companies.

Head of the new firm is Joseph B. Durra, former advertising and sales promotion manager of CIBA Co.'s plastics division.

•

Rheem Plans Tacoma Plant

Rheem Mfg. Co. has announced plans for the construction of a steel container manufacturing plant on a five-acre site in the Port of Tacoma Industrial Tract, Tacoma, Wash.

Production of drums for petroleum and chemical processors in the Pacific Northwest is scheduled to start in the fall, according to an announcement by E. F. Paquette, vice president and general manager of the container division.

•

POSITION OPEN
TECHNICAL SALESMAN
for
COLOR PIGMENTS

We are looking for a man between 25-40 with technical experience in the paint, ink or resin field. BS degree in chemistry or chemical engineering required. Midwest sales area. Man selected will train 6 months to 2 years in Technical Service Laboratory in Louisville, Ky., then move to territory. Salary is open and will be commensurate with background and experience. Applicants please include photo and college transcript. Address all communications to:

W. R. Fritsch, Vice-President
KENTUCKY COLOR & CHEMICAL CO.
Louisville 12, Ky.

New Cellofilm Representative

Phillips & Martin Co. of Chicago has been named exclusive sales agent for Cellofilm Industries, Inc., manufacturers of nitrocellulose base solutions.

•

West Coast Warehouse Open

Colton Chemical Co., a division of Air Reduction Co., Inc., has opened West Coast warehouse facilities in Los Angeles for the bulk storage of emulsions for the paint and adhesive industries.

According to Bernard R. Krashin, Colton president, Colton Flexbond 800 copolymer acetate emulsions will be available in bulk and drums for delivery to the Los Angeles and San Francisco areas.

Travis V. Rankin, Colton's West Coast district manager, is in charge of the new operation.

•

Research Unit Expanded

Research facilities of Shawinigan Resins Corp. have been expanded for the second time in two years, according to an announcement by Dr. R. N. Crozier, research director.

The new research unit at Springfield, Mass., contains complete laboratories and equipment for conducting basic research, process and product development and end-use research.

ZINFLEX® TEACHES LACQUERS NEW TRICKS!

ZINFLEX — a low viscosity modified shellac for lacquers — can impart many new qualities to your formulations and produce truly superior lacquers.

Moreover, with ZINFLEX you can use more shellac in your lacquers, because ZINFLEX has been modified for greater compatibility with hydrocarbon solvents and other common lacquer diluents. And look what ZINFLEX can do for your

WOOD LACQUERS

- **clearer, deeper finish**
- **better adhesion, elasticity, mar resistance**
- **high oil and naphtha resistance**
- **high solids content at working body**

METAL LACQUERS

- **greater adhesion to brass, aluminum, tin plate and steel**
- **better build**
- **improved flexibility**
- **greater hardness**
- **PLUS the same advantages ZINFLEX gives to wood lacquers**

ZINFLEX is made by the producers of Regular and Refined Vac-Dry shellacs — bleached shellacs of maximum uniformity, cleanliness, solubility and keeping qualities.

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319 N. Western Ave. Chicago 12, Ill.

NEWS

Becomes Research Director

The appointment of Dr. Thomas H. Davies as a director of research of the Mellon Institute has been announced by General Matthew B. Ridgway, chairman of the Board of Trustees.

Dr. Davies has been the administrative head of the Multiple Fellowship sustained in the Institute since 1952 by the Pittsburgh Plate Glass Co. He previously had been an associate professor in the Institute for Nuclear Studies, the Department of Chemistry and the Institute of Radiobiology and Biophysics of the University of Chicago.

Dr. Davies also has been an associate section chief of the Clinton Laboratories at Oak Ridge, Tenn., a research chemist with Lederle Laboratories and a National Research Council fellow in medicine at the California Institute of Technology.

He is the holder of an A. B. and a Ph.D. from Johns Hopkins University.

In his work at Mellon Institute, Dr. Davies has developed a rigorous research program on problems of structure, surface chemistry and the solid-state physics of glass.

In his new position, he will aid in bringing to the institution gifted scientists wishing to pursue research. He will also carry on personal research in biochemistry and will counsel the Institute's research staff in the field of glass research.

•

Trask Moves Offices

Arthur C. Trask Co. has moved executive offices to 327 S. LaSalle St., Chicago 4, Ill. The firm's warehouse remains at 3959 S. Wentworth Ave. in Chicago.

•

Establish N. Y. Office

The establishment of a Ferro Chemical Corp. office at 507 Fifth Ave., New York, N. Y., has been announced by S. B. Elliott, president of the corporation.

Saul Gobstein heads the new office. He is also technical representative for the New York and New Jersey sales territory.

•

West Coast Plant Completed

Potters Brothers-California, Inc., has completed a plant for the manufacture of glass reflective spheres, it has been announced.

The spheres are used for reflective highway markings, reflective signs, reflective paints and other purposes. Expanded highway construction and emphasis on highway safety were cited as the factors increasing the demand for glass reflective spheres in the western United States.

•

Cargill Laboratory Completed

Completion of a modern research laboratory near Wayzata, Minn., has been announced by Cargill, Inc.

The three-story building houses a central research unit for all divisions of the firm. It includes 11 fully equipped modular laboratory units, research library, the operating center of the firm's communications system, experimental area and office facilities.

The new unit embodies a novel "open" floor plan which encompasses all laboratory units in one area, but separates each from the others with partitions of less-than-ceiling height to afford privacy and quiet while permitting even illumination, ventilation and air conditioning.

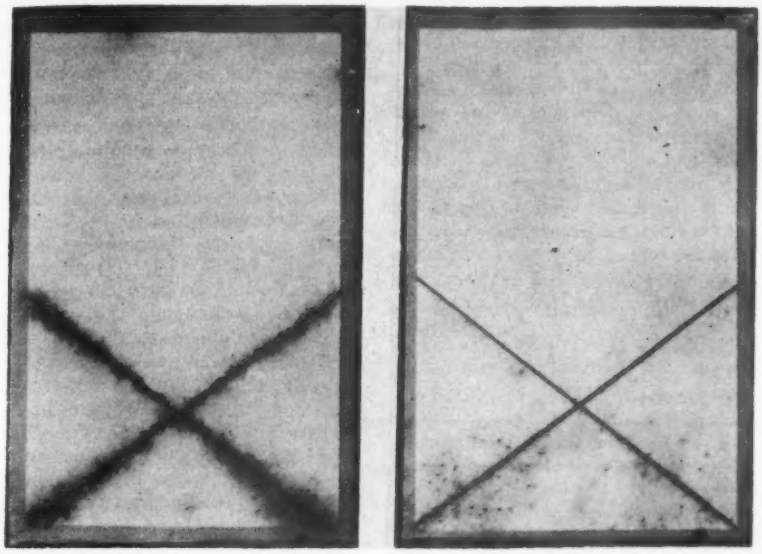
Short of technical manpower . . . time . . . capital . . . plant capacity? It's good management to turn your pigment dispersion problems over to R-B-H. Then you can direct everything you have at improved formulation and sales development.

R-B-H Dispersions

DIVISION OF INTERCHEMICAL CORPORATION
DISPERSION TECHNICIANS
BOUND BROOK, NEW JERSEY

Pigment dispersions in nitrocellulose; ethyl cellulose; urea formaldehyde; vinyl and alkyd resins; chlorinated rubber and other plastic binders.

(*From page 37*)



Hand sprayed primer and a finish coat.

Thin primer coating, hand sprayed primer and a finish coat.

Figure 4. Photographs of painted steel panels after 30 months in a marine atmosphere.

use of special techniques, the uncoated reverse surface may be welded without damage to the vinyl coating. The vinyl coating is resistant to weather, to abrasion, and to attack by many common acids and solvents.

In conclusion, as a result of the work at U. S. Steel's Applied Research Laboratory, we believe that (1) the basic principle of preventing surface deterioration of steel is sound, and that continued work will result in better and cheaper products made of steel; (2) the service life of a paint film depends upon the corrosion resistance of the steel to which the paint is applied—the greater the corrosion resistance, the longer the service life; (3) the service life of a paint film is greater when application is made on "clean" steel than when it is made on hot-rolled, weathered, wire-brushed steel; and (4) under marine atmospheric conditions, a paint system having a zinc chromate primer gives longer service life on a high-strength low-alloy steel than does a paint system having a red-lead linseed-oil primer.

References

1. F. L. LaQue and James A. Boylan, Corrosion, 9, No. 7, July 1953.
2. USS COR-TEN High-Strength Low-Alloy Steel, a trade-marked product of the U. S. Steel Corporation.
3. Federal Specification TT-P-86.
4. A proprietary paint similar to SSPC Paint 11-55-T.
5. Federal Specification TT-P-31b.
6. R. B. Mears and R. H. Brown, Corrosion, 3, No. 3, 97 (1947).

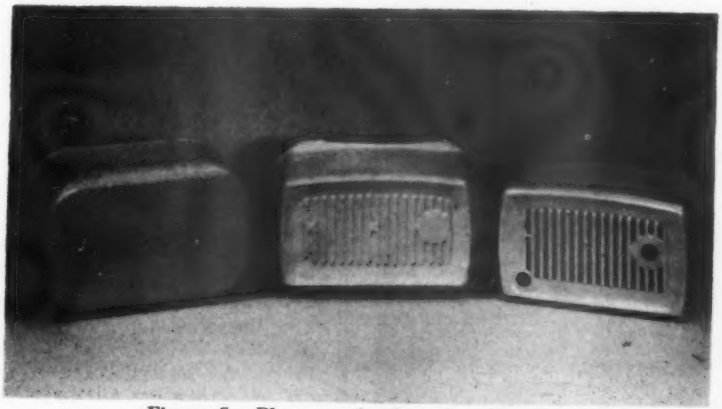


Figure 5. Photograph of steel radio cabinets formed from vinyl-steel laminates.

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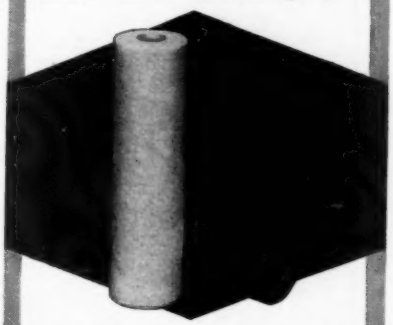

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. . . all-metal construction, continuously self-cleaning without stopping process. Ideal for all high-volume, single-color applications. Filtration from .062" down to .0035".

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PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Coating for Food Wrapping Paper

U. S. Patent 2,791,569. Peter Stanley Backlund, Anaheim, Calif., assignor to Union Oil Co. of Calif., Los Angeles, Calif., a corporation of California.

A coating composition having a high sealing strength and being suitable for use in coating food wrapping paper and paper containers, said composition comprising a heart-cut paraffin wax having a melting point between about 150°F. and about 170°F. and containing less than about 1% of oil and between about 0.5% and about 5% by weight, based on the wax, of a polyolefin having an average molecular weight between about 8,000 and about 20,000, said heart-cut paraffin wax being prepared by topping a waxy crude oil to remove gas oil and lighter fractions, separating slack wax from the topped crude oil, deoiling and distilling said separated slack wax and in the distilling operation discarding the first 40% to 60% overhead and leaving between 5% and 30% as bottoms to obtain a heart-cut.

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VINYL ACETATE SOLUTIONS

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VOLUME PRODUCTION BEATS THE COST OF CUTTING YOUR OWN

Why tie up valuable floor space, personnel and equipment, when you can buy your solutions now, ready-made, from the largest company in the country devoted exclusively to the production of solutions. Let experts, backed by more than forty years of experience in nitrocellulose solutions, show you the modern way.

ANY AND ALL SOLVENT COMBINATIONS

There are standard formulations to meet every requirement, or Cellofilm is prepared to make up any formulation to your most rigid specifications. . .with correctly controlled viscosity, perfect uniformity, at the right price, and always delivered on time. Make your own comparison, write or phone for a generous sample of the formulation you require and let us quote you the amazingly competitive prices.

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WOODRIDGE, NEW JERSEY · GEneva 8-7100

Colored Pigment For Camouflage Coatings

U. S. Patent 2,796,357. Warren M. Foss, Nixon, and Walter K. Nelson, Metuchen, N. J., assignors to National Lead Co., N. Y., N. Y., a corporation of New Jersey.

A green pigment consisting of a solid state solution of chromium sesquioxide, cobalt oxide, zinc oxide and titanium dioxide, the amounts of said oxidic compounds being analytically present on a molar basis from:

1.0 to 3 mols chromium sesquioxide
1.0 to 3 mols cobaltous oxide
5 mols titanium dioxide
0.1 to 3.0 mols zinc oxide

provided that when the ratio of chromium sesquioxide to cobaltous oxide is greater than one on a molar basis, the amount of zinc oxide will be from 50 to 100% the molar amount of chromium sesquioxide, and provided further that when the ratio of chromium sesquioxide to cobaltous oxide is less than one on a molar basis, then the amount of zinc oxide will be from 75 to 100% the molar amount of cobaltous oxide; and characterized by a spectrophotometric curve having an increase of about 40 percent reflectance value units in the wave length range of from 670 to 750 millimicrons.

Coating Composition

U. S. Patent 2,797,168. John R. Gimler, Morristown, N. J.

A coating composition characterized by substantially complete resistance to internal cracking or crazing when in the form of an applied film on a substantially rigid surface and subjected to temperatures of the order of minus 60°F., and having a softening point not substantially below 150°F., said composition consisting of approximately 93 parts by weight of microcrystalline wax, approximately 6 parts by weight of a naphthenic petroleum oil having a pour point of minus 60°F., and approximately 1% by weight of zinc sterate.

Drying Oils From Petroleum Fractions

U. S. Patent 2,795,631. Joseph F. Nelson, Fred W. Banes and Anthony H. Gleason, Westfield, N. J., assignors to Esso Research and Engineering Co., a corporation of Delaware.

Process for preparing a synthetic drying oil which comprises cracking a petroleum fraction in the presence of 50 to 90 mol percent steam at a temperature between about 1000 and 1600°F., segregating a C_4 cut containing between about 20 and 50 mol percent of butadiene-1,3 monomer and about 40 to 72 mol percent butenes, polymerizing said C_4 cut at a temperature between about 50 and 100°C. in the presence of

about 1.2 to 5 parts by weight of an alkali metal catalyst per 100 parts by weight of monomer, controlling the polymerization with from about 1 to 100 parts by weight of an ether per 100 parts by weight of monomer, said ether being selected from the group consisting of lower aliphatic ethers and dioxane-1,4 and recovering a colorless drying oil.

Process for preparing synthetic drying oil which comprises cracking a petroleum fraction in the presence of 50 to 90 mol percent steam at a temperature between about 1000 and 1600°F., segregating a C_4 cut containing between about 20 and 50 mol percent butadiene-1,3 monomer and about 40 to 70 mol percent butenes, copolymerizing said C_4 cut with 15 to 25 parts of styrene monomer at a temperature between 50 and 100°C. in the presence of about 2 to 5 parts by weight of an alkali metal catalyst per 100 parts of the monomers, controlling the polymerization with from 1 to 100 parts by weight of an ether per 100 parts of the monomers, said ether being selected from the group consisting of lower aliphatic ethers and dioxane-1,4 ,and recovering a colorless drying oil.

Resinous Composition

U. S. Patent 2,795,566. Gennady M. Kosolapoff, Auburn, Ala., assignor to Monsanto Chemical Co., St. Louis, Mo., a corporation of Delaware.

A resinous composition comprising polyvinyl chloride plasticized with bis-(2-ethylhexyl) benzylphosphonate.

Non-Dusting Asphaltic Coatings

U. S. Patent 2,797,169. Edward W. Mertens, El Cerrito, Calif., assignor to California Research Corp., San Francisco, Calif., a corporation of Delaware.

An asphaltic composition suitable for producing thin protective coatings of improved resistance to dusting, which comprises an asphalt and a small amount, from about 0.025% to about 5% of said asphalt, of a dust inhibiting diphenylamine having a polar substituent on at para-phenylene diamine, and para-isopropoxy diphenyl-group consisting of thio-diphenylamine, N,N'-diphenyl-least one of said phenyl rings and is selected from the amine.

Odorless Coating

U. S. Patent 2,795,563. Hans Low, Edwardsville, Ill., assignor to Shell Development Co., Emeryville, Calif., a corporation of Delaware.

An odorless surface coating composition comprising a mixture of an air-drying resinous ester containing esterified unsaturated fatty acid of 12 to 22 carbon atoms and having an iodine number of at least 110 dissolved and dispersed in a hydrocarbon thinner consisting essentially of at least 92% by weight of isoparaffinic hydrocarbons boiling within the range of about 300°F. to about 470°F., the concentration of said resinous ester in said mixture of resinous ester and isoparaffinic hydrocarbon thinner being from about 10 to 35% by weight, said composition also containing, to increase the miscibility of the resinous ester in the isoparaffinic hydrocarbon thinner, a solubilizing amount of non-ionic surface active agent for the resinous ester in the range of about 0.3 to 8% by weight of the thinner, said surface active agent containing 14 to 50 carbon atoms and possessing at least one alcoholic hydroxyl group in the molecule.

Two-Colored Patterned Coating

U. S. Patent 2,795,562. Arthur Jud, Oberengstringen, Zurich, Switzerland, assignor of one-half to Jean Spillmann, Zurich, Switzerland.

A coating material for producing two-colored, patterned surface coating comprising: an aqueous color carrier comprising a binding agent and a cellulosic fibre and an immiscible, non-aqueous color carrier and cellulosic fibres therein.

LANCASTER, ALLWINE & ROMMEL

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•

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Patent Practice before U. S. Patent Office. Validity and Infringements Investigations and Opinions.

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Troy's new compact unit combines a powerful disperser head with the rugged diamond-shaped agitator to produce finished homogeneous batches without further milling — for the majority of present inks and paints.
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New Books

A Guide to The Literature of Chemistry

By E. J. Crane, Austin M. Patterson and Eleanor B. Marr. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $9.50.

The second edition of a reference that has been in use for 30 years. Thoroughly rewritten, the new volume contains two new chapters, one on trade literature and another on government publications.

Shifts in emphasis, condensations and expansions, and fresh approaches nevertheless maintain the basic aims: to provide the most frequently used information, to give sources of additional material, to lead to the sources of less frequently used information, and to point out methods of keeping up to date on the literature, as well as the methods of using it.

The Guide covers books, periodicals, patents, miscellaneous sources, indexes, libraries and procedure in literature searches.

Dr. Crane is director and editor of the Chemical Abstracts Service and editor of *Chemical Abstracts*. The late Dr. Patterson was professor of Chemistry at Antioch College. Dr. Marr is associate professor of Chemistry at Hunter College.

The Alkali Metals—Hydrogen and Its Isotopes

By Robert C. Brasted and John F. Suttle. Published by D. Van Nostrand Co., Inc., Princeton, N. J.

The sixth of a planned series of eleven volumes called "Comprehensive Inorganic Chemistry" edited by Mr. Brasted and M. Cannon Sneed.

Lithium, sodium, potassium, rubidium, cesium and francium are discussed jointly in order to emphasize the the differences between the various alkali metals. The book contains a comprehensive study of the chemical properties, occurrence, preparation, alloys, properties in liquid ammonia and analytical chemistry of the metals and their compounds.

The 248-page work is illustrated throughout with more than 50 comparative charts and tables. There are also a large number of phase and solubility diagrams of the various compounds of the elements discussed.

•

Custom Processing Offered

Eastman Chemical Products, Inc., has announced a custom processing plan for the production of industrial chemicals on a commercial basis.

According to J. E. Magoffin, chemicals division sales manager, the new program will benefit the relatively small company which wants to place a newly developed product on the market, but must delay the immediate expense of large scale equipment.

Also to benefit from the plan, according to Mr. Magoffin, is the larger firm which wants to speed up marketing plans, but which lacks certain processing knowhow or equipment.

Other ways in which the plan is expected to aid customer companies are that it will enable a firm to do a thorough job of advance test-marketing before erecting a new plant, and the service will relieve companies of the undertaking of complex or hazardous operations in which Eastman has greater experience.

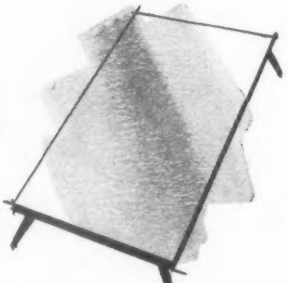
Custom processing services will be handled at Eastman's Kingsport, Tenn., facilities. They will cover such reactions as acetylations, aldol condensations, anhydride formation, hydrogenations, dehydrogenations, dehydrations, esterifications and oxidations.

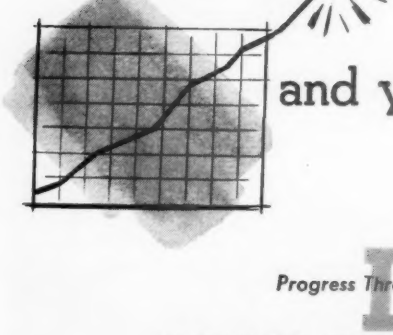
When you add

to

your customers get

a fine matte finish
(without any hand rubbing)





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Progress Through Chemistry

DAVISON CHEMICAL COMPANY
Division of W. R. Grace & Co.
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PHENOLIC RESINS

(*From page 47*)

offer a minimum of interference with traffic. In a test conducted by Des Moines, Iowa, traffic engineers to find the traffic paint with the best wear resistance, 10 competitive stripes were painted. One-half-hour drying time was allowed before traffic was permitted to pass. Traffic flowed at the rate of 17,000 cars and trucks daily. At the end of six months, all other stripes had failed, while the dispersion-based paint was still in good condition. The traffic paints adopted by the States of Illinois and Missouri currently are based on these dispersions. The paint vehicle itself consists of 50% dispersion and 50% of a modified phenolic varnish. The dispersion imparts excellent abrasion resistance to the paint, as well as lending quick drying properties, while the modified phenolic varnish increases the flexibility. Depending upon traffic conditions, the dispersion-based paint has withstood up to 1 year without the necessity of restriping.

It must be evident from what has been said above that phenolic resin-based coatings find a very wide range of application. It has been possible only to roughly outline the scope of these versatile materials and to mention a few representative practical applications. There is almost an endless number of successful case histories for these tough, durable, weather- and chemical-resistant coatings. The variety of formulating possibilities, coupled with the variations which can be imparted during resin manufacture, contribute to the remarkable adaptability of these materials to so many different end uses in the protective coatings field.

The fact that phenolic resin-based coatings have continued over the years to be the mainstay of the industrial protection field, in the face of increasingly stringent requirements, is the best testimony of their value. The future outlook for phenolic resin-based coatings is enhanced by a continued discovery of new uses for existing formulations as well as of entirely new techniques. In the new techniques field, the cold-mix varnishes have already been mentioned. A new development here permits the preparation of cold-mix enamels in one step. Pigment dispersion and vehicle formation can be accomplished simultaneously in standard paint mixing equipment. Of importance also is the combination of phenolics with other resins in formulations which provide even wider and better properties for special applications. For example, a combination of "Bakelite" phenolic resin BKS-2710 and vinyl butyral resin XYHL has been successfully developed for use as a knot primer-sealer by the Western Pine Association. Neoprene rubber-based adhesives may be improved by the addition of not more than 45 per cent of "Bakelite" phenolic resin CKR-1634. The resulting material has much higher bond strength and improved elevated temperature qualities.

In short, although phenolic resins for coatings have been in use for some time, continued research will undoubtedly produce new and original developments in the coming years.

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You can meet the consumer demand for odor-free paints of every type—standard, acrylic, latex-based, polyvinyl acetate or alkyd—at a fraction of a cent per gallon for effective VANDOR odor treatment.

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NEWS

NPVLA Combines Activities

The Scientific Section and the Technical Division of the National Paint, Varnish and Lacquer Assoc. have been consolidated under the name of Scientific Section, according to an announcement by Joseph F. Battley, president.

Charles E. Loucks, technical director, is responsible for the administration and supervision of the Association's scientific and technical activities. Francis Scofield has been appointed director of the Scientific Section.

The Section's laboratory branch will work on scientific and technical problems, conduct cooperative investigations with other trade organizations and will prepare circulars.

The technical publications branch will prepare and distribute the Raw Material Indexes, Guide to U. S. Government Paint Specifications, Abstract Review and Technical Bulletins.

•

NYU Offers Fall Course

Basic principles of the manufacture and application of paint, varnish and lacquer products will be the subject of a 15-week evening course this fall at New York University's Division of General Education.

Dr. Myron A. Coler, consulting engineer and technical director of the Markite Co., and Elias Singer, technical director of the Troy Chemical Co., will be instructors for the surface technology course.

The class will meet from 8:10 to 9:55 p.m. on Wednesday evenings from September 25 through January 22 at NYU's Washington Square Center.

•

Becomes Philadelphia Agent

E. W. Kaufmann, P.O. Box 447, Flourtown, Pa., has been named exclusive agent in the Philadelphia area for the Baker Castor Oil Co., it has been announced.

Mr. Kaufmann has had more than 20 years of experience in serving the chemical industry.

CALENDAR OF EVENTS

Aug. 19-23—Organic Coatings Conference, Kimball Union Academy, Meriden, N. H.

Sept. 8-13—ACS, Div. of Paint, Plastics and Printing Ink Chemistry, New York, N. Y.

Oct. 30- Nov. 2—Annual Convention, Federation of Paint and Varnish Production Clubs, and Paint Industries' Show, Bellevue-Stratford Hotel, Philadelphia, Pa.

Nov. 4-6—70th Anniversary Meeting of National Paint, Varnish and Lacquer Assoc., Sheraton-Park and Shoreham Hotels, Washington, D. C.

Production Club Meetings

Baltimore, 2nd Friday, Park Plaza Hotel.

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Columbus — Jan., June, Sept., Fort Hayes Hotel.

Cleveland, 3rd Friday, Harvey Restaurant.

Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.

Detroit, 4th Tuesday, Rachham Building.

Golden Gate, 3rd Monday, El Jardin Restaurant, San Francisco.

Houston, Monday prior 2nd Tuesday, Ship Ahoy Restaurant.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, University Club, Boston.

New York, 1st Thursday, Brass Rail, 100 Park Ave.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, Annual Only.

Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.

Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.

Rocky Mountain, 2nd Wednesday.

St. Louis, 3rd Tuesday, Kings-Way Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Oak Room, Union Station.

Western New York, 1st Monday, 40-8 Club, Buffalo.

TECHNICAL Bulletins

ZINC OXIDE

A brochure covering the preliminary results of an investigation of the use of zinc oxide pigment in polyvinyl acetate latex paint is available from the American Zinc Sales Co., Dept. PVP, P.O. Box 327, Columbus 16, Ohio.

A discussion of experimental work includes pH considerations, zinc oxide free controls, pebble mill grinds vs. high speed mixing, evaluation of latices in relation to zinc oxide stability, advantages of zinc oxide in PVAc latex paint, effect of zinc oxide on pH and KU of PVAc paints and preliminary exposure studies on Western Red Cedar.

A tentative specification for a polyvinyl acetate latex to have maximum stability with zinc oxide is also given. The booklet is the first of an anticipated series to be offered to the paint industry.

MOTORS AND DRIVES

A line of a.c. and d.c. motors, gearmotors, motor-generator sets, motor controls and complete packaged mechanical and electronic adjustable-speed drives are described in an eight-page, two-color, illustrated brochure prepared by Reliance Electric and Engineering Co., Dept. PVP 24701 Euclid Ave., Cleveland 17, Ohio.

The booklet is designated Bulletin A-2501.

ACRYLIC PAINT

"Basic Concepts of Acrylic Emulsion Paint Technology" is the subject of a 12-page brochure offered by the Rohm & Haas Co., Dept. PVP, Washington Square, Philadelphia 5, Pa.

The booklet is based on a series of lectures prepared by Gerould Allyn for the University of Florida's recent short course in paint technology.

Subjects covered include a summary of the development of water-thinned paints, the technology of acrylic emulsions, acrylic paint formulations, manufacture of acrylic paints, equipment used, application to various types of surfaces, properties of acrylic paints and a general discussion of exterior acrylic coatings.

The brochure also contains two synthesis flow charts and four tables showing properties and typical formulations for a low cost primer sealer, a white wall coating and tint base, and an exterior top coat.

pH ELECTRODES

An eight-page bulletin numbered 86-5 features Beckman pH electrodes for laboratory and portable pH meters. The bulletin is made up in simplified chart form, completely indexed and illustrated to guide users in selecting correct pH electrodes.

A new revision, the bulletin is one of a five-bulletin package which also includes information on the Zeromatic, Pocket pH, and other Beckman pH meters.

The package is available from Scientific Instruments Division, Beckman Industries, Inc., Dept. PVP, Fullerton, Calif.

WET GROUND MICA

A list and subject index of technical bulletins, numbers one through 30, is now available from the Wet Ground Mica Assoc., Inc., Dept. PVP, 420 Lexington Ave., New York 17, N. Y.

The 30 bulletins include studies on the use of wet ground mica in a number of different paint systems such as alkyd paints, various types of latices for indoor and outdoor use and chlorinated rubber paint. The bulletins also give detailed test methods and review existing formulations.

The research on which the bulletins are based was done in the Surface Technology Laboratory of the Research Division, College of Engineering, New York University, under the direction of Dr. Max Kronstein.

CONTROLLED VOLUME PUMPS

Bulletin No. 553-1 describing a line of motor-driven controlled volume pumps has been published by The Milton Roy Co., Dept. PVP, 1300 E. Mermaid Lane, Philadelphia 18, Pa.

The 32-page bulletin contains complete specifications and latest design features of positive displacement pumps designed for precise metering and pumping of corrosive liquids against pressure.

Standard and modified models and their applications are illustrated and described. A special feature section contains useful data and charts with recommendations for materials selection and usage plus other handy reference information.

INDUSTRIAL TRUCKS

A complete line of fork-lift trucks, straddle carriers, powered hand trucks and towing carriers is covered in a 16-page, heavily illustrated, four-color catalog by Industrial Truck Division, Clark Equipment Co., Dept. PVP, Battle Creek, Mich.

Fork trucks covered include solid tire and pneumatic tire gas-powered models, solid tire electric-powered models and gas and diesel-powered pneumatic tire models. Specifications given for each include capacity, turning radius, width, length, fork length, lift heights and service weight.

Complete specifications are also given on eight straddle carrier models.

Electric-powered hand trucks described include tuggers, pallet trucks, low-lift platform trucks, high-lift platform trucks and stackers.

Eight towing tractors are also described, including gas-powered, electric powered, solid tire and pneumatic tire models. Specifications indicate drawbar pull, maximum capacity, turning radius, width, length, height and weight.

A separate section covers 24 attachments for fork trucks.

RED LEAD

The twelfth in the Lead Industries Assoc.'s series of Red Lead Technical Letters which present technical information and paint formulations for the protection of steel for all purposes and conditions, has been released.

The letter is devoted to "Painting Highway Structural Steel," and it presents a number of complete painting systems for the purpose, including primers, touch up and field coats for both three and four coat systems. Recommended methods of surface preparation are included, as well as primers with both normal and semi-quick drying times.

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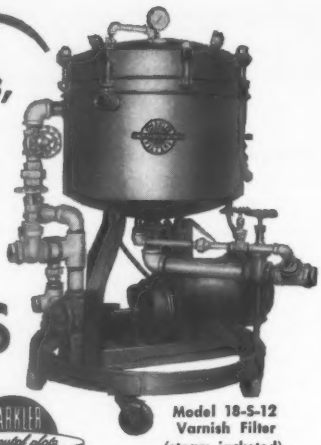

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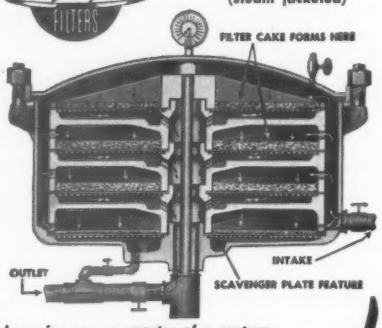

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The technical letter also contains suggestions for various colored finish coats. Among the formulas presented are several which meet the specifications of the American Assoc. of State Highway Officials and federal specifications.

Copies of the technical letter may be obtained from Lead Industries Assoc., 60 East 42nd St., New York 17, N. Y.

CALCIUM CARBONATES

Two technical bulletins have been prepared for paint manufacturers and polyvinyl chloride resin compounders and are being issued by Diamond Alkali Co., Silicate, Detergent, Calcium Division, Dept. PVP, 300 Union Commerce Building, Cleveland 14, Ohio.

The first bulletin, titled "Low Sheen Flat Alkyd Wall Paints with Non-Fer-Al," summarizes the principle advantages provided by the precipitated calcium carbonate when used as an extender in formulating "dead flat" type wall paints. The six-page bulletin presents typical analysis and physical properties and eight representative formulations in successful commercial usage.

"Diamond Precipitated Calcium Carbonates for Polyvinyl Chloride Applications," a 16-page bulletin, briefly reviews the use of eight Diamond chemicals as inert fillers for compounding polyvinyl chloride plastic products.

The bulletin presents data on such subjects as filler requirements, plant processing considerations, physical properties of vinyl compounds, basic stock formulations and plasticizers, supplemented by tables and examples relating to plasticizer efficiency factors, filled stocks and filler adjustment factors in PVC 50.

A compendium of primary applications and principle properties of Diamond precipitated calcium carbonates, and 54 graphs or charts covering tensile, modulus and hardness factors of unfilled and filled stocks complete the presentation.

PRE-CURED TANK LINING

An eight-page technical bulletin describing properties of "Fairprene" T-5594 synthetic elastomer prevulcanized protective lining is now available.

The illustrated booklet sets forth in chart form chemical resistance results obtained from immersion tests. Data are also included on "Fairprene" cements and putties used in fabricating liners from the pre-cured isobutylene material.

The booklet points out that installation work should be done by experienced personnel, although "Fairprene" may be installed at the site and requires no cure. Two pages of the bulletin are devoted to methods of installation.

The booklet is available from Du Pont Fabrics Division, Dept. PVP, Room 8033, Du Pont Building, Wilmington 98, Del.

GUM ARABIC SOLUTIONS

Laboratory reports A-820-G2 and A-820-G3, which contain data on the preparation of clear solutions from various types of Gum Arabic,

are available from Morningstar, Nicol, Inc., Dept. PVP, 630 West 51st St., New York 19, N. Y.

The data sheets supplement a technical service bulletin on the general subject of Gum Arabic, its uses and properties. Report A-820-G2 describes Premium XXX grade, designed to eliminate filtration or straining of Gum Arabic solutions.

Report A-820-G3 explains how maximum clarity and freedom from natural insoluble matter may be attained, depending upon the concentration of gum solution desired. It also compares the use of powdered and granular forms of gum for solution manufacture in cases where complete filtration of the final product is part of the processing procedure.

AGITATOR SELECTOR

A selector which automatically indicates the best Pneumix agitator for each liquid batch mixing problem has been announced by the Eclipse Air Brush Co., Dept. PVP, 390 Park Ave., Newark 7, N. J.

The selector is called the Pneumix Capaci-Dial. By turning the pointer to the size of the batch to be mixed and looking into the window opposite the consistency of the fluid and the amount of agitation desired, the user may determine the correct agitator.

The back of the dial contains a description of the most outstanding features of Pneumix, the air motored agitator around which the selector was designed. The Capaci-Dial is pocket sized and durable.

COAL PRODUCTS CHART

The latest edition of the Barrett chart, "Products Derived From Coal," is now available to technical people in industry as well as faculty members and students of schools and universities.

The new edition of the chart is more complete than ever, and contains a number of derivatives not mentioned in previous issues. The chart may be obtained from Barrett Division, Allied Chemical & Dye Corp., Dept. PVP, 40 Rector St., New York 6, N. Y.

VISCOMETRAN

An application data sheet on the Brookfield Viscometran is now available from the Brookfield Engineer ing Laboratories, Inc., Dept PVP, Stoughton 112, Mass.

The four-page, two-color brochure explains in detail the advantages, process requirements, design features and typical installations of the Viscometran and its application to end point determination of polymerization reactions.

The brochure is designated Brookfield Application Data Sheet 020.

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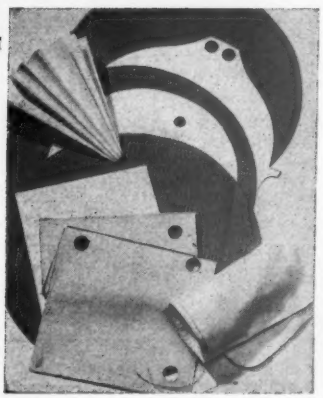

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